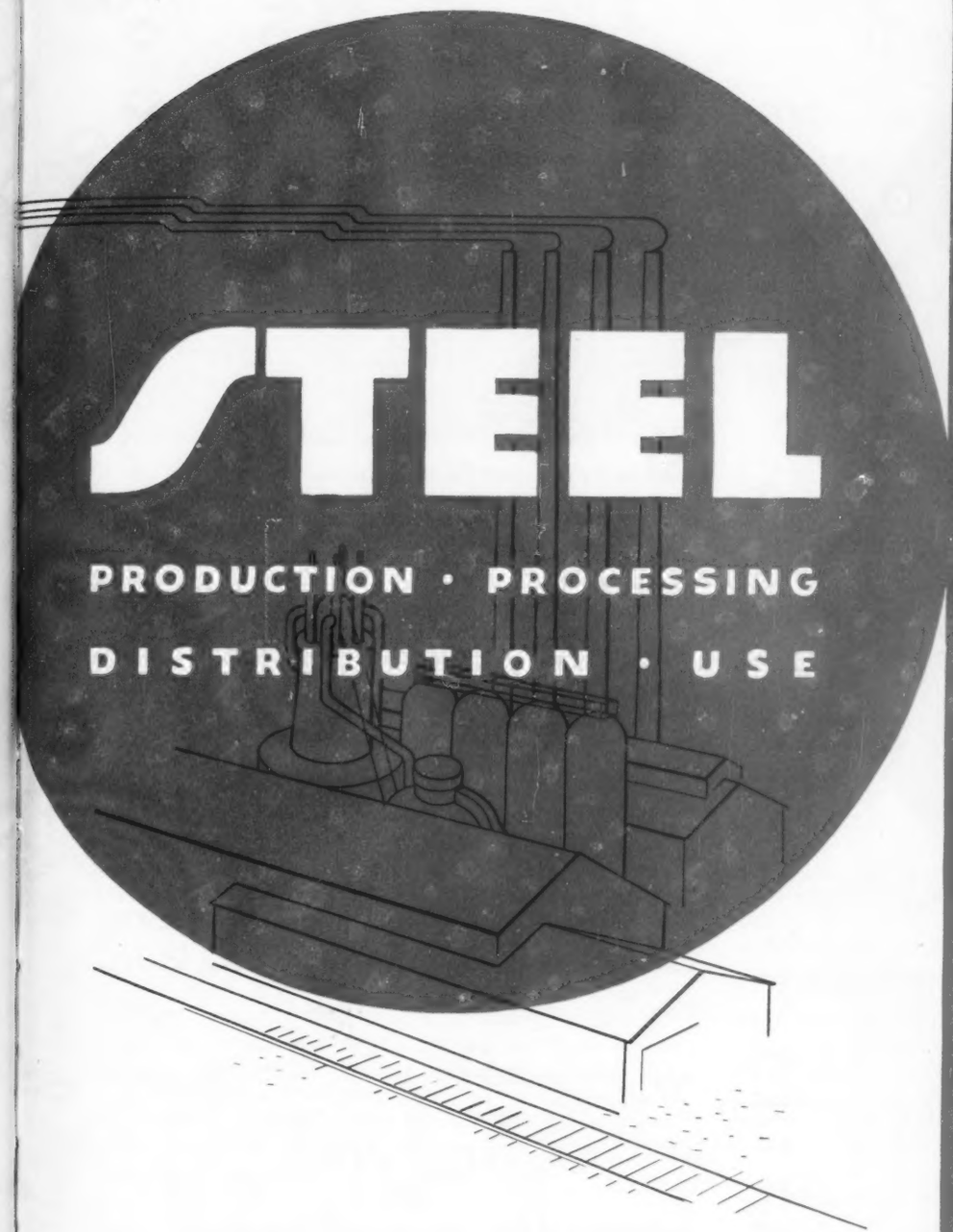

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Statesmanship Is Industry's Chief Need in Facing Challenge of 1937

VIEWED in perspective, the past year assumes some of the rags-to-riches attributes of a Cinderella. Born in the humble environment of recovery, 1936 rose rapidly to affluence and ended its brief career in a spectacular outburst of splendor, amid many of the outward trappings of prosperity.

For the iron, steel and metalworking industries the year brought forth more in volume of business, in profits, and in unexpected problems than had been envisioned by the most imaginative forecasters. Few, indeed, were the seers who predicted that steel ingot output would rise to 48,876,700 tons (p. 340), thereby establishing the third largest annual production on record. Probably no one, prior to Jan. 1, 1936, foresaw that hundreds of industrial companies would be paying extra dividends with the abandon that marked disbursements in the final quarter of the year. And, while everyone was prepared for almost anything that might happen in the relations between government and business, few had any idea that various events throughout 1936 and the election of Nov. 3 would clarify certain national and economic issues as definitely as they now appear. In this respect, it was a year of revelation.

AMONG the tangible developments of the year which are encouraging to industry generally was the unmistakable improvement in the durable goods industries. The revival of activity during the last six months in capital expenditures is significant in that it presages a better balanced situation for 1937. The increased demand emanating from railroads, from producers and manufacturers for buildings and equipment, and from other consumers of heavy materials and products is an encouraging sign that marked improvement at last has reached the laggards in the recovery parade.

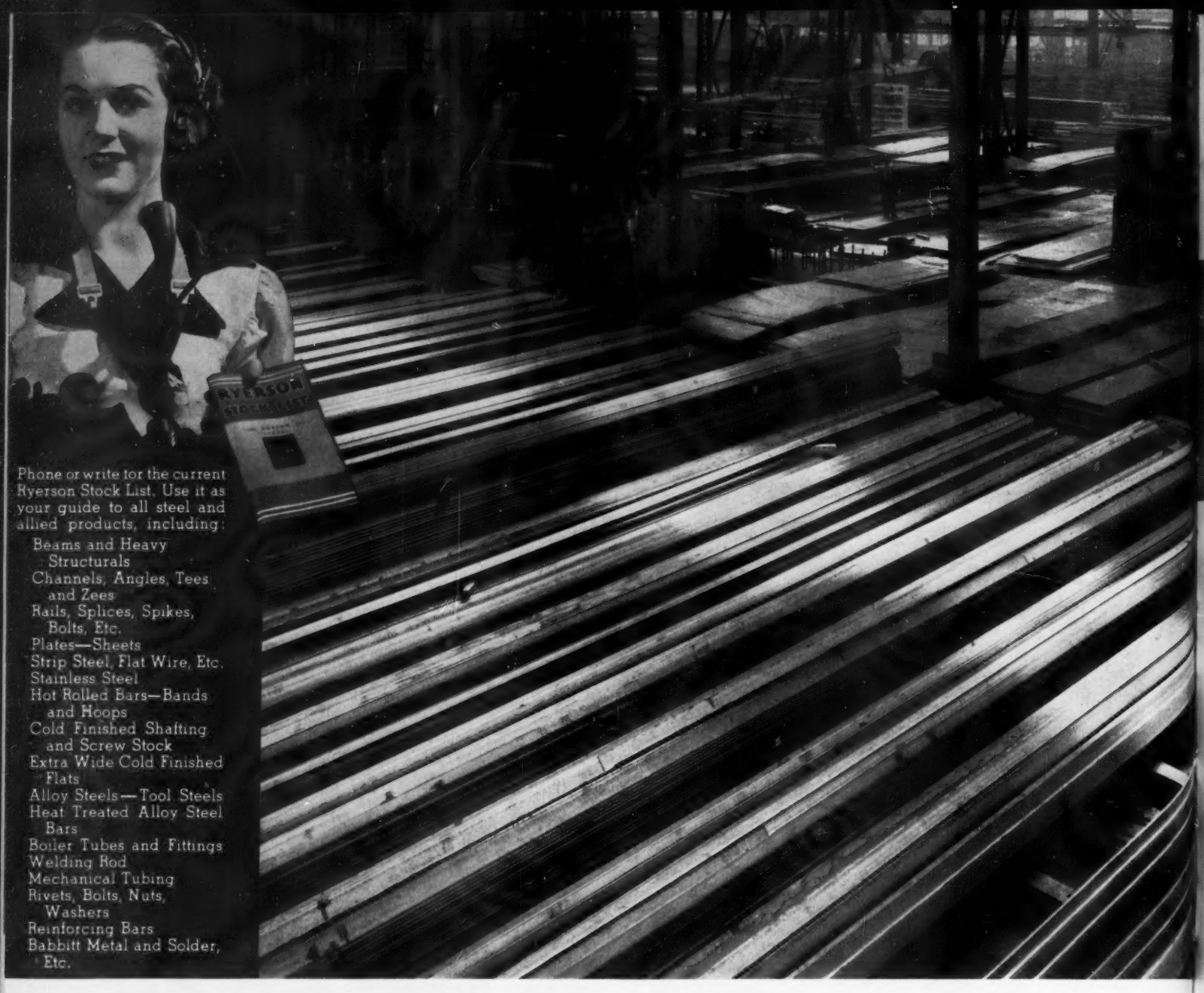
However, one exception should be noted. General building construction still is far in the rear. Until activity in this field expands to a point of equality with other important branches of industry, the economic structure of the nation will remain out of balance. Construction undoubtedly will gain in 1937 (pp. 246, 330), but the handicaps of high cost, poor organization, labor difficulties, etc. will postpone normalcy in this field until 1938 or later.

On an average, industrial activity at the peak of the year, in the third week of December, was on a par with activity in September, 1929. STEEL'S index of activity for the week ending Dec. 19, 1936, stood at 114.6 (p. 323), the highest point recorded since the week ending Aug. 31, 1929. A few barometers of activity, particularly that of electric power output (p. 328), established new all-time peaks repeatedly throughout 1936.

The crescendo of activity in the closing months of the year presages a brisk carryover into the new year. In addition, the accumulation of requirements for rehabilitation and expansion, held back by uncertainty in recent years, promises a further continuance of steady demand which seems to assure well-balanced activity in the first half of 1937.

WITH a fair degree of prosperity ahead, the question arises as to how well the iron, steel and metalworking industries are prepared for a greater volume of business. This query, expressed in the phrase "Is Industry Prepared for Real Prosperity?" was proposed last September by the editors of STEEL as the theme of this "Yearbook of Industry" number. Subsequent events have made the *motif* more appropriate than was anticipated at the time it was adopted.

In introducing the question of preparedness, STEEL necessarily is cast in the role of a friendly critic. While not oblivious to the many praiseworthy accomplishments of industry in 1936, the contributors to this issue have been asked to place emphasis upon the factors in which industry is deficient, rather



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than upon the elements in which it is amply fortified. In accentuating the weak spots in the armor of preparedness, our revelations, we hope, will serve our industries better than would equal effort expended upon complimentary observations.

FOREMOST among the challenges to industry in 1937 will be the problem of personnel (p. 234), which involves not only the momentous enigma of labor relations, but also the reduction of unemployment, training of workers, preparation of better foreman and other "noncommissioned" officers, and selection of executives of higher caliber. On the first count—labor relations—no critic, no matter how callous he may be, has justification for finding fault with industry's defense of employe relations plans against the stacked-card game which government and professional unions are playing. The representation plans, with 18 years of successful operation behind them, are worth fighting for. Until professional unions can match the accomplishment of employe representation, they have no right to government favor.

In the matter of training workers, industry and government are guilty of negligence. Four or five years ago James A. Farrell warned employers of a shortage in skilled workers. Industrial companies have been backward in training men for jobs in which a shortage was clearly indicated. The federal government is even more to be censured, because in undertaking to be the paternalistic sponsor of the oppressed it has done absolutely nothing to prepare its unfortunate charges for useful occupation. This is one of the blackest marks against the nation, and one that will prolong the unemployment problem unnecessarily.

IS INDUSTRY fortified financially for real prosperity? Probably not, largely because the "inordinate reluctance" (p. 239) of American corporations to pay an ill-advised federal tax on undistributed earnings has prompted them to disburse badly needed capital to stockholders who think it is "income." We pin the medal for dumbness upon the legislators who passed the 1936 federal tax law, but in fairness it must be said that many directors of industrial companies, prompted by an insane abhorrence against federal taxes, authorized dividends which by all the dictates of common sense should have been retained for insurance against unforeseen contingencies. Industry, in general, is not too strongly entrenched financially for real prosperity.

IN PUBLIC relations, industry is faced with the necessity of mastering a new technique. Having neglected the problem for so many years, a number of industrial executives now are striving hard to adopt sound methods of courting public opinion. The ideal situation (p. 243) would be one in which every industrial enterprise establishes by its every day acts the goodwill of the people in the community in which it operates. If this utopian scheme were operative, there would be no need of national educational programs.

But as a practical solution, industry is sorely in need not only of improved local relations but of intelligent national publicity. The stumbling block in public relations is not skill or ability of public relations experts. Instead it is the blindness of a few executives in key positions to the power of public opinion.

INDUSTRY—traditionally more expert in matters of plant, equipment and operations than in the intangibles of external relations—in 1936 made marked progress in preparing its physical facilities for a greater volume of business. Its record of rehabilitation and expansion (p. 109) is impressive. If there are flaws in the production and manufacturing facilities, they are largely in lack of balance and in the obsolescence of certain units in the chain from mine to finished product. For instance, a shortage of soaking pit capacity (p. 109) is imminent.

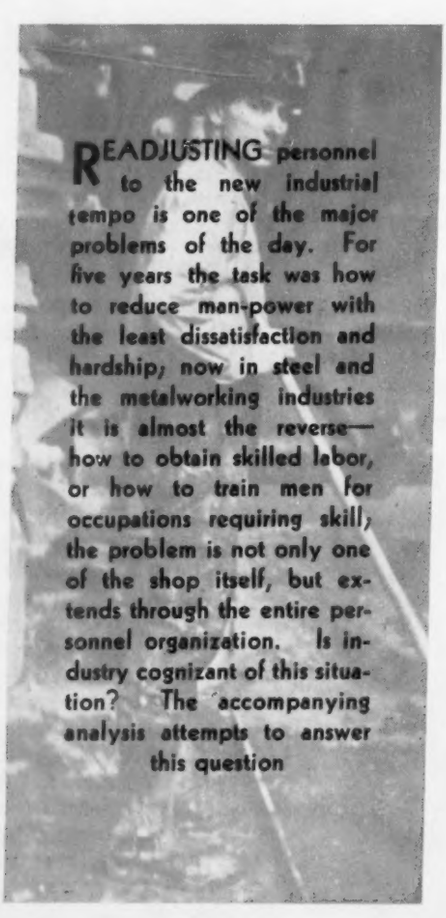
In technological progress, 1936 was a significant year in the metalworking industries. Advances were recorded in almost every operation (pp. 272-314) involved in the forming, handling, treatment and finishing of steel.

The year witnessed new appreciation of the potentialities of the continuous mill and of the unlimited possibilities in co-ordinating many branches of industry to the requirements of mass consumption markets. The pioneering effort of industry in this field has opened the eyes of sales executives to new opportunities. Five years ago, the metalworking industry generally could be criticized legitimately for negligence in market research. Today its executives are distinctly more market-minded (pp. 246-268) than at any time in recent industrial history.

In summary, it may be said that industry is not fully prepared for real prosperity. Increased volume of business will tax its resources severely. The exigencies of a changed economic and political nation will challenge its capacity for sagacity in its external relationships. But industry usually rises to great heights of accomplishment when hard pressed. History shows that it has thrived best under the stern whip of emergency. It is to be hoped that it can match its material achievements with a sterling quality of statesmanship in the months to come.

IN PRESENTING this "Yearbook of Industry" number, the editors of STEEL wish to express their warm appreciation of the co-operation extended by hundreds of individuals in the iron, steel and metalworking industries. Their willingness to provide statistics, to express convictions on significant problems confronting industry, and otherwise to lend authority and breadth of opinion to the editorial content of this issue helps to make it a realistic mirror of industry as it exists at the dawn of a promising new year.

PERSONNEL



READJUSTING personnel to the new industrial tempo is one of the major problems of the day. For five years the task was how to reduce man-power with the least dissatisfaction and hardship; now in steel and the metalworking industries it is almost the reverse—how to obtain skilled labor, or how to train men for occupations requiring skill; the problem is not only one of the shop itself, but extends through the entire personnel organization. Is industry cognizant of this situation? The accompanying analysis attempts to answer this question

TO ANYONE who recalls the speed with which American manufacturing industries mobilized men and machines when this country entered the World war, recent activities in the face of a tremendous demand for production must appear to be slow motion. To be sure, a similar emergency does not exist, though the spread between prospective requirements and the ability to fulfill them quickly may now be even greater, because the facilities represented by skilled mechanics and modern equipment are not in the plants and in the case of the former are not immediately available.

It has been aptly said that in the downward spiral of business, forward views are too optimistic, and in the upward swing opinions as to the future are too pessimistic, an unfortunate truth in recent experience. Many companies have not yet come out of the depression—many never will come out—and there have been many problems to think about besides rebuilding personnel.

Shortage of skilled workmen, now generally reported, was due to the inescapable consequences of several years' enforced retrenchment, idleness and scattering of man power. This bred a spirit of caution, possibly too pessimistic, and certainly revealing a lack of a sufficiently broad and flexible system of planning and training.

It was early in 1935, with the first real evidence that business was on the upgrade, that metal trades employers were noting a scarcity of the right kind of men, a paradox almost unbelievable with 10,000,000 or more unemployed. Then it became recognized this condition was no longer localized. Trade associations were warning members; convention speakers were telling of their troubles. The thought then was that it would not do to publicize this too much for fear of the effects it might have on organized labor, already poised to spring. By late fall the shortage, the

imperative demand for training men, the responsibility of management was a central theme at practically every trade convention. The whisper had become a shout.

In all these gatherings, seldom did disinterested speakers, called because of their standing in public affairs, emphasize the joint responsibility of labor. The main responsibility has been thrust upon—if not already assumed—by management. As a result of this unpreparedness in the training of skilled labor, it is recognized we are likely to see again a period of premium wages, and proselyting of labor such as characterized the postwar boom.

Concerning the actual number shortage of skilled workers there is probably as much conjecture as there is regarding the total number of unemployed employables. Reports from individual companies and districts range from "no shortage" to "serious shortage." The only agency which apparently has attempted a comprehensive survey, the National Industrial Conference board, estimated an obsolescence and mortality rate of 5 per cent for skilled mechanics in normal years, and "a percentage probably higher during the depression."

On the basis of a 5 per cent rate alone, 30 per cent have passed out of the picture during the past six years—when little effort was made to build up replacements. If to this be added the withdrawals of men to engage in other occupations and others who from prolonged unemployment have lost their skill, it seems reasonable that probably more than 40 per cent of the immediately available supply has been eliminated.

SOME additional reasons for the draining away of this man power are reported to be revolutions in manufacturing methods. Single-purpose machines have been replaced by special-purpose, automatic tools. In place of a fair supply of all-around machinists, industry is left with a surplus of single-machine operators, and a rapidly diminishing number of highly skilled men.

Promotions have removed many others from the production ranks; a shortage exists in some occupations because an adequate supply of craftsmen has never been trained; true, for example, of electric arc welders. Immigration restrictions—shutting out thousands of skilled workers—have been felt; organized labor has resisted apprentice training; apprentices themselves have been impatient for immediate results; small plants have been unable to carry forward with training, and have left it to the larger companies, which in turn have had to curtail or abandon their own plans.

Some of the remedies now proposed and being adopted in many instances are: To make apprentice training more attractive to the young men who have become available in the past six years; for smaller companies to collaborate more than they have through trade associations, and in conjunction with public educational bodies; by waiving age limits to utilize older men, and to make machines even more automatic in operation in order that still less skill is required.

The problem of finding and training young men is being made more difficult as the ease with which these men can find work for themselves at good wages, with the possession of little or no mechanical ability, increases. Most public employment agencies have been reporting a strong demand not only for skilled men, but all types, including the so-called "white collar" and even minor executives. It is plain America is going back to work.

In the steel industry, employment exceeds the 1929 level by 10 per cent, and at higher wages than in 1929. Home building and general construction work in many parts of the country have been going forward so rapidly as to cause acute shortages of artisans. The federal index of employment in all manufacturing industries and in the durable and nondurable goods groups for 1935 was 86, compared to 82 in 1934 and the 100 average for 1923-25.

SINCE March, 1933, the depression low, manufacturing industries have called back to work 3,500,000; agriculture 1,500,000; construction 1,500,000; service industries 1,300,000, and trade distribution and finance 1,300,000. Out of a total of some 8,000,000 unemployed, United States chamber of commerce estimates there are only about 4,000,000 actually employable. It is from the diminishing reservoir of idle men, from those employed but seeking improvement, and from younger men coming from the schools that the metalworking industries must draw recruits.

For prompt action it is now recognized men must be trained right on the job; for the long-time policy, industrial associations are quickening co-ordinated efforts of manufacturing groups, and also are seeking to make fuller use of public vocation education. The National Metal Trades association and the National Founders association are among the group agencies which have had remarkable success in formulating programs and encouraging the training of machinists, toolmakers and foundry workers.

The automotive, agricultural implement and malleable shops and foundries were feeling the pinch more than a year ago, and as the heavy work foundries are increasing tonnage they likewise are finding it difficult to obtain experienced men.

An interesting example of community vocational training is found in Cleveland, where the Associated

Industries organization has expanded its co-operative facilities. In 1929 this association's foundry group sponsored and equipped a $40,000 foundry addition to the Cleveland trade school. A year later the patternmakers' group established a department for apprentices at the trade school. Last year the forging manufacturers added a die sinking course for apprentices to the school's machine shop division. Just recently it retained the services of an expert in apprentice training to correlate all its efforts.

Leaders in the association's governing body have pioneered in apprentice training. Heading the vocational education committee is Warner Seely, seccretary, Warner & Swasey Co., Cleveland. He says:

"First of all, industry acting in unison must establish its own training facilities through industry-wide and community-wide co-operation, setting standards of training and definite measurements for progress. Next, industry must establish direct relationship with every functioning public agency from state and federal bureaus to local high and trade schools. These contacts, if based upon a genuine spirit of co-operation, will find the public administrators eager for the counsel and guidance of industry. Finally, with standards agreed upon and potential employment needs forecasted on a scientific basis, preoccupational training and guidance in tune with the actual needs of industry should be developed under the leadership of industry."

Of his own company's training work, he says: "You can't tell the apprentice from the seasoned workman except by the measure of his years and the color of his own shop coat. Both work at the same machines and on the same jobs, the only difference being in the speed of their performance, and wage rates compensate for that. High productivity will usually result, so that the dollar value of apprentice output will offset *all* the training costs. In a case which came to my notice recently, the shop efficiency for workmen was 86 per cent and that for apprentices was 81 per cent.

"There are some who contend that the cost of apprentice training is so high as to make it impossible, but I am convinced apprentice training can carry its own cost if intelligently organized."

In Youngstown, O., 35 vocational night school classes are being held weekly, with instruction in 14 subjects by 22 instructors, of whom 17 are company officials and others, and five from the Youngstown public school faculty.

RADIO listeners recently have heard the Refrigeration and Air Conditioning institute, Chicago, broadcast appeals for young men to apply for training in installing and servicing equipment. The institute's work represents a novel experiment in co-operative effort on the part of 50 manufacturing companies.

A $35,000 laboratory and equipment in Chicago are privately owned but policies, courses and general procedure are directed by a board of manufacturers' representatives. Graduates are given diplomas, which are recognized as evidence of proficiency wherever the equipment is made or installed. Only a few graduates have yet been available because it was not until June, 1936, that the first class was graduated; however, the entire class found immediate employment. The laboratory where they are trained contains practically every type of refrigeration and air conditioning apparatus and control equipment in use today.

Men are accepted for enrollment for training only after passing a careful examination to determine character, mental attitude, physical fitness and general ambition. Then follows a test of 800 to 900 hours of study and preparation in their own homes, including the successful answering of 75 per cent of 1100 questions, over a period of a year or more. This correspondence course period finds many students dropping out. One hundred hours of additional hard work in the laboratory and shops in Chicago and more fade from the picture, because here too the student must earn a grade of 75 per cent to be eligible for a diploma.

The cost of the complete training course to the student, including attendance at the laboratory and his transportation to and from Chicago is $172, payable $8 per month. By this procedure only the serious-minded student starts, and he may stop at any time he changes his mind, without there being a loss in the undertaking to train him.

Many leading machine tool and equipment manufacturers have for years maintained highly developed training courses. Prospectuses of the Cincinnati Milling Machine Co., Allis-Chalmers Mfg. Co., and General Electric Co., to mention only three, resemble those put out by some universities describing their engineering

INVESTMENTS in apprentice training are beginning to pay handsome dividends as the shortage of skilled help in numerous trades is being felt more keenly

courses; and some of these work not only with the most inexperienced high school graduate of a mechanical turn of mind, but offer higher type of technical training to college graduates.

Apprentice courses in various trades and in drafting are conducted by the Allis-Chalmers company in connection with the vocational schools and in cooperation with the industrial commission of Wisconsin. Many executive, managerial, supervisory, sales and service positions with the company are now largely filled by former students. Advances through promotions come from these sources. The company says that it rarely looks outside of its own organization for an executive.

FOR more than 30 years apprentice training has been an important part of factory management of General Electric. Today it is only one of many company training programs, each designed to furnish trained employes for a definite purpose. There are now, in the eight apparatus plants of the company, 450 machinist apprentices in training. This is less than half the number on the course in 1929. This reduction has not been due to a change in policy of the company or a decrease in the value of the apprentice graduate in factory work. During the depression the company had to choose between apprentices and the highly trained nucleus of experienced factory workers.

The following interesting information is given by the company to indicate results and to answer the question: Does it pay? "If we consider the jobs occupied by the apprentices after graduation and what it would cost to train men for these jobs by any other means, the whole cost of apprentice training is more than offset. Some loss occurs because of inability to 'time' properly the number of graduates to meet business cycles. We have lost a good many apprentices during the depression but many of them will come back to us as business improves. We must also remember that while some of our apprentices get positions with other companies, our present factory force includes hundreds of men who have obtained apprentice training with other companies.

"At one plant apprentice training was started in 1902. To date 1400 boys have graduated from the course. Besides machinists, toolmakers and factory supervisors, the graduates remaining with the company include one works manager, one assistant works manager, one general superintendent, one mechanical superintendent, two district office managers, and 50 district office and service shop employes. Among those who left the company, 25 have responsible positions in power stations, 73 in education work, two associate editors of trade magazines, and 65 in arsenals and navy yards. Eighty per cent of the drafting force in this plant are apprentice graduates.

"At another plant the apprentice course was started in 1910 and has graduated 424 apprentices. Of this number 224 are still employed in the plant, and 135 of these have attained positions as follows: One superintendent, two assistant superintendents, one general foreman, one cost department head, one assistant supervisor, 13 foremen, 15 assistant foremen or leaders, 20 draftsmen, 13 wage payment and planning men, four production clerks, 40 tool designers and toolmakers, three laboratory men, five inspectors, six electrical test men, three power house employes, three cost men and three personnel and payroll men.

TRAINING of apprentices is an important part of plant activities at Farrel-Birmingham Co. Inc., Ansonia, Conn., as well as at numerous other large industrial companies

"These summaries illustrate that the General Electric apprentice system produces a large amount of useful material besides machinists. We believe that this is as it should be and we know of no better or cheaper way of properly training employes for these positions."

Further, to build personnel General Electric has an extensive "business interneship" training course. Since it was organized in 1919 over 1000 college graduates have been employed, and of these more than 600 still are on its payroll. From these young men have been made available for key positions on such short notice that no experienced accountants, auditors or financial men have been employed from outside sources for over 15 years.

Graduates now occupy positions as: Assistant comptroller, assistant treasurer, assistant secretary, statistician, auditor of disbursements, tax accountant, auditor of corporate accounts, chief traveling auditor, auditor of merchandise division, appliance and merchandising department, and president of subsidiary finance company. This list does not include 43 traveling auditors, and 29 auditors, chief accountants and treasurers of subsidiary companies and distributors. There are also several in important foreign assignments. The success of this program has encouraged the company to inaugurate recently a similar program emphasizing merchandise manufacture and distribution.

THIS matter of finding or training men of higher mental caliber for business and management functions is stressed by executives, almost as much as the lack of skilled mechanics. It is a thought uppermost in the minds of many in laying out training courses that they may find some men of outstanding ability for the higher occupations. There is evidence that this lack is felt by companies of all sizes and descriptions. The rapid shifting of office, sales and management personnel has been apparent in the metalworking industries throughout the year.

"There is at present a great dearth of men who

can handle men," says Alfred Kauffman, president, Link-Belt Co., Chicago.

"American business management needs a system for discovery, development and assignment of executive personnel," says Edward R. Stettinius Jr., chairman of the United States Steel Corp. finance committee, who suggests the appointment of an officer in charge of "leadership" selection, and the placing of the right man in the right place.

Coincident with their efforts in this direction the larger steel companies have also expanded their employe training work. Carnegie-Illinois Steel Corp. has placed this work in the hands of an experienced instructor and co-ordinator (see STEEL, Dec. 14 and Aug. 31, 1935).

TRAINING of men has always commanded a foremost place with Bethlehem Steel Corp. Ever since C. M. Schwab selected the "Bethlehem boys" to shoulder the responsibility of organizing and operating the corporation, the possibilities and rewards for an apprenticeship to industry were given a substantial rise. The so-called Bethlehem "loop" is a creation born of the successful effort to absorb college-trained men into the steel industry, the early stages being a looping or routing of the young men through the various divisions of a steel plant. The idea of starting a college graduate at the very bottom, even laboring, was a departure from usual procedure, but over a period of years faithful adherence to this policy has furnished many of the company's best operating and sales executives.

Several "loop" courses were conducted by Bethlehem prior to 1922, but in 1922 it organized the first class of the present "observational training course" series. This course has operated every year since 1922 with the exception of 1931 to 1933. From 1922 to date, an average of 64 college graduates a year have been absorbed by the course. It has never been necessary to go out for hundreds of college men at one time. The steady admission of carefully selected men has been a factor in the success of the company.

From 1922 to 1930, inclusive, the observational training course was conducted for a period of ten weeks each year, after which the graduates were assigned to definite departments for further training. Since 1930, the ten-week period has been shortened considerably, but in effect the men by a period of orientation and plant visits coupled with later periods of departmental and plant visitations and observational training for some groups, are given opportunity to acquire the necessary background for their future assignments. The present training course is supervised by a manager of training, who early in January makes a thorough survey of the needs of the various divisions of the corporation for understudies and recruits for training. With this information he is prepared to place before the universities and colleges information relative to the type of collegiate training desired.

The various universities and colleges, many of which have placement bureaus, assist in acquainting the qualified seniors with the company's needs and assemble applications made on regular forms. These applications are then carefully examined, with a view to specific needs. The manager of training then arranges an itinerary of these colleges and interviews the applicants. Sales candidates go through at least two sales interviews before final selections.

It is significant that while steelworks operations in the closing months of 1936 ranged between 75 and 80 per cent—equivalent to about 88.6 per cent on the basis of 1929 capacity—the number of employes in the industry rose to 531,000, highest in history, 15 per cent above the maximum number employed in 1929.

Undoubtedly the outstanding development of the past year, so far as steel labor is concerned, was the adoption of the sliding scale method of paying wages by the United States Steel Corp., and the simultaneous advance of 10 per cent in wage rates Nov. 16 by virtually all producers. This brought steel's annual payroll to $936,000,000, with wage rates 19 per cent above the 1929 level. Average hourly rates now are 73 cents, compared with 65.4 in 1929.

In the industry the sliding scale system is considered an experiment, with only time to demonstrate whether it achieves its purpose for arriving at an equitable settlement without controversy.

It is conceivable that settlements based on this scale may be followed by other steel producers — even though they are not committed to it to the same extent as the Steel corporation.

In the face of the very evident purpose of the great majority of employers to deal fairly with employes, the drive by the committee for industrial organization has made little real progress in the steel industry; its principal claim to attention is as a source of annoyance, and its propaganda —which can be dealt with by the industry only through the medium of the right kind of publicity and public relations. The theme of all that has been done in this direction so far is that work must come through industry, and that labor, too, has a responsibility in promoting conditions under which industry may flourish.

FINANCES

IN GOOD or bad times a sound financial position is one of the best assets an industrial enterprise can boast. Therefore, in considering the question of whether or not industry is ready for a period of real prosperity, it is important to examine typical balance sheets and to determine the degree of financial preparedness for a greater volume of business.

Fortunately the nation is blessed with sufficient money to meet almost any conceivable emergency. Billions of dollars of investment funds are seeking profitable employment. Therefore the problem is not one of scarcity of capital; rather it is one of the availability of funds to the units of industry which may require them if business continues to improve.

On this point, STEEL's informants agree that thus far industrial companies have experienced little trouble in borrowing money from banks. In fact, industrial executives and bankers in widely separated sections of the country declare banks are prepared and eager to make more loans to industrial companies than have been sought in recent months. The following statement is from a New England bank president, whose experience is typical of conditions in the industrial East:

"Generally speaking, banks are very anxious to make loans. At present banks are still facing a declining volume of loans and, at the same time, a declining rate of interest on investments. We have, for example, government bonds upon which the average yield at present prices is only 1.34 per cent. In the meantime our loans are at the lowest point in many years. We are not only making all proper loans that we can but we are looking for them. The simple fact is that up to date the majority of business men do not feel sufficiently certain of making a profit to make them willing to borrow.

"At present our loans amount to only 60 per cent of our normal loan volume. That this is not because of any unwillingness on our part alone is proved, I think, by the fact that during the entire year to the end of November, we had declined applications for just 90 loans and the total amount declined was $218,105.50. Only four loans asked for in the amount of over $10,000 were declined during this period and only 28 (including these four) over $2000."

From Chicago comes this corroborative report: "My friends in several of the Chicago banks state they are having difficulty loaning money because of the fact most of their clients are fairly well supplied with cash. This condition may change as business becomes better and facilities are increased to meet increased production, because in many cases borrowed money will have to be used to take care of such a program. I believe banks are exceedingly anxious to loan money for this purpose, and are particularly glad to favor relatively small or moderate sized companies whose reputation and general reliability and proper management are such that they are considered as a good risk."

In view of the foregoing testimony, one of two conclusions may be drawn. Either the management of industrial companies has not

yet felt the urge to borrow money extensively, or its financial resources are such that up to the present it has not needed outside funds in large amount.

This suggests that the financial position of industry may be sounder than is generally realized. To test this supposition, the editors of STEEL compiled average comparative balance sheets from the statements of representative companies in the iron, steel and metalworking field. The results show that in spite of the terrific ordeal of the depression, typical well-managed industrial companies have been able to maintain very presentable balance sheets.

FROM Balance Sheet "A," shown on the opposite page, it will be noted that the financial position at the end of 1935 was good, although not as sound as at the end of 1928. As of Dec. 31 in the pre-depression year the ratio of current assets to current liabilities was 6.8 to 1, an exceptionally gratifying comparison. At the end of 1935, as the companies were well on the way out of the depression, the ratio of currents was 5.7 to 1. On the asset side, securities were lower in 1935, but cash was greater. Net worth was up slightly, as was the debt. Reserves for contingencies were down moderately.

In studying the composite balance sheets, it was evident a rather sharp line of demarcation could be drawn between the financial position of the larger companies and that of the smaller ones. To analyze this variation more carefully, supplementary balance sheets were prepared. Balance Sheet "B" is an average of the five larger companies, "C" of the seven smaller enterprises.

Immediately readers will detect a difference in the reports. The current assets to current liabilities ratio for the larger concerns at the end of 1928 was 7.4 to 1. At the end of 1935 it was 6.8 to 1, a drop of only 8.1 per cent. For the seven smaller companies the ratio as of Dec. 31, 1928 was 4.5 to 1 compared with 2.8 to 1 as of Dec. 31, 1935.

Other discrepancies are apparent. Marketable securities of the larger companies declined 32 per cent, while those of the smaller companies dropped 92 per cent. However, total current assets of the smaller companies increased slightly while those of the larger concerns dropped fractionally. Units in both groups improved cash positions and inventories.

Current liabilities of the smaller companies leaped upward by 75 per cent, whereas those of the larger concerns were up only 2.5 per cent. The large units increased their reserves for contingencies, while the small establishments suffered a loss of 84 per cent in this item. This point is significant in view of the effect of federal tax legislation.

OBVIOUSLY, the statements as of Dec. 31, 1935, were extremely gratifying for that period. The weaknesses in financial position, if any, probably would be accentuated during 1936. The pertinent question, therefore, is whether typical companies were able during the past 12 months to increase cash, reserves and surplus and to expand working capital to meet the requirements of the greatly increased volume of business that developed in the second half of 1936 and seems to be promised in 1937.

Executives to whom the editors of STEEL turned for views on this point were unanimous in blaming the 1936 federal tax law for hindering management in its obvious task of financial preparedness.

H. S. Simpson, president, National Engineering Co., Chicago, writes: "The sad part of the picture is the tendency on the part of corporations to pay out too many dividends by reason of the undistributed profits tax which certainly will tend to restrict the accumulation of reserves many companies otherwise would have available for the purchase of equipment and other capital expenditures. I am hoping the tax law will be changed so that it will not penalize either the paying off of old debts or the purchase of equipment. If this is not done then companies will not be able to increase employment as much as otherwise would be the case."

James W. Hook, president, the Geometric Tool Co., New Haven, Conn., believes that much new capital will be needed. "The question that arises is this: Is credit available to American industry as it was in the past? In my judgment it is not. Congress, in its desire to spread purchasing power, increase revenue and eliminate bad loaning and investment practices, has made both borrowers and lenders timid. The result may well be a demand for government itself to supply the capital needed, especially in the small industry field where the undistributed earnings tax has dealt such a telling blow."

An eastern banker, who prefers to remain anonymous, declares that "in a very large number of cases the payment of these dividends is bad for the corporations involved and is bad for the individual stockholders who receive them. They are simply 'eating the seed corn' and are fooling themselves just as much as they did when they spent apparent profits in the rising security markets in '28 and '29."

How much of the "seed corn" has been eaten in 1936 will not be known until the financial statements as of Dec. 31 of that year become available. However, it is apparent from recent news that hundreds of companies preferred distributing a large portion of their profits to paying a stiff federal tax. Many of them, it is feared, weakened themselves in the process. As one authority put it, "The inordinate reluctance to pay the tax caused many to pay out cash in dividends to the ultimate great detriment of the companies involved."

IF, AS seems so likely, industry generally suffered in its financial preparedness during 1936, what are the remedies? One is better management, regardless of outside influences. The other is legislation better adapted to requirements of typical units of industry.

Common faults of management in financial matters include attempting to expand too fast, paying too large salaries, unwillingness to keep cash beyond the apparent needs of the day, investments in a poor grade of securities because of dissatisfaction with the rate of income on investments that are proper for reserves, and failure to maintain working capital.

Good management is indispensable. Two companies starting on a par in opportunity, will wind up far apart in the degree of financial success. Some companies cannot stand prosperity.

The same is true in times of depression and in periods when public opinion, legislation and other external factors make it more difficult for management to achieve success. Yet under the most discouraging conditions, some establishments will pull

Comparative Balance Sheet "A"

Averaged from Balance Sheets of 12 Representative Companies in Metalworking Industries

ASSETS:	Dec. 31, 1928	Dec. 31, 1935
Cash	$ 1,479,898	$ 1,944,769
Receivables	2,675,921	2,986,545
Inventories	4,959,073	5,438,448
Marketable securities	3,662,706	2,421,229
Miscellaneous	387,067	18,945
Total current assets	$13,164,665	$12,809,936
Plant and equipment	$12,059,956	$12,533,650
Deferred assets	342,591	419,542
Other assets	1,154,321	1,970,735
Total fixed assets	$13,556,868	$14,923,927
Total assets	$26,721,533	$27,733,863

LIABILITIES:	Dec. 31, 1928	Dec. 31,1935
Accounts payable	$ 916,034	$ 1,174,848
Accrued for taxes, etc.	639,973	611,527
Miscellaneous	367,631	437,080
Total current liabilities	$ 1,923,638	$ 2,223,455
Funded debt	4,056,709	4,365,665
Total debt	$ 5,980,347	$ 6,589,120
Reserves for contingencies	872,548	700,409
Net worth	19,868,638	20,444,334
Total	$26,721,533	$27,733,863
Net working capital	$11,241,027	$10,586,481
Gross sales	$17,558,731	$12,426,218

Comparative Balance Sheet "B"

Averaged from Balance Sheets of Five Largest Companies Reported in Balance Sheet "A"

ASSETS:	Dec. 31, 1928	Dec. 31, 1935
Cash	$ 2,802,876	$ 3,664,635
Receivables	5,520,695	5,784,971
Inventories	10,199,575	11,325,037
Marketable securities	8,507,474	5,789,369
Miscellaneous	810,000	9,883
Total current assets	$27,840,620	$26,573,895
Plant and equipment	$24,616,747	$26,371,808
Deferred assets	693,665	955,610
Other assets	2,679,981	4,551,773
Total fixed assets	$27,990,393	$31,879,191
Total assets	$55,831,013	$58,453,036

LIABILITIES:	Dec. 31, 1928	Dec. 31, 1935
Accounts payable	$ 1,688,894	$ 2,103,402
Accrued for taxes, etc.	1,353,238	1,218,046
Miscellaneous	738,533	553,806
Total current liabilities	$ 3,780,665	$ 3,875,254
Funded debt	9,200,000	10,160,000
Total debt	$12,980,665	$14,035,254
Reserves for contingencies	1,405,494	1,569,431
Net worth	41,444,854	42,848,401
Total	$55,831,013	$58,453,086
Net working capital	$24,059,955	$22,698,641
Gross sales	$37,704,686	$26,130,700

Comparative Balance Sheet "C"

Averaged from Balance Sheets of Seven Smallest Companies Reported in Balance Sheet "A"

ASSETS:	Dec. 31, 1928	Dec. 31, 1935
Cash	$ 534,914	$ 716,296
Receivables	643,939	987,669
Inventories	1,215,858	1,233,742
Marketable securities	202,158	15,414
Miscellaneous	84,992	25,417
Total current assets	$ 2,681,841	$ 2,978,538
Plant and equipment	$ 3,090,820	$ 2,649,251
Deferred assets	91,824	36,636
Other assets	64,563	127,137
Total fixed assets	$ 3,247,207	$ 2,813,024
Total assets	$ 5,929,048	$ 5,791,562

LIABILITIES:	Dec. 31, 1928	Dec. 31, 1935
Accounts payable	$ 363,991	$ 511,596
Accrued for taxes, etc	130,500	178,300
Miscellaneous	102,701	353,703
Total current liabilities	$ 597,192	$ 1,043,599
Funded debt	382,929	226,854
Total debt	$ 980,121	$ 1,270,453
Reserves for contingencies	491,871	79,680
Net worth	4,457,056	4,441,429
Total	$ 5,929,048	$ 5,791,562
Net working capital	$ 2,084,649	$ 1,934,939
Gross sales	$ 3,168,763	$ 2,637,302

NOTE: In compiling the above balance sheets, the reports of 12 companies in *Poor's* industrial section were analyzed, the amounts of assets and liabilities weredded to form a composite, and this was divided by 12 to produce an average which appears as "Balance Sheet A." The same method was used for Balance Sheets "B" and "C", covering the reports of five and seven companies, respectively.

The 12 companies include a machinery builder of moderate size, a medium-size independent steel producer, a roller bearing manufacturer, a manufacturer of pneumatic equipment, a commercial forging company, a small electrical equipment manufacturer, a builder of rolling mill equipment, a small steel producer, a structural steel fabricator, a manufacturer of power transmission equipment and a machine tool builder.

All are well managed companies and their financial status at the end of 1928 and 1935 probably was above the average in their respective fields.

through with flying colors, while others will fail or suffer terrific hardship.

In nine out of ten cases the determining factor is management. In comparatively few cases can circumstances arising from outside influences be used legitimately as excuses for failure.

FROM the foregoing discussion, it is apparent that the financial condition of individual companies in the iron, steel and metalworking industries today is more closely related to federal government policy than at any previous time. While the management of a business enterprise still has wide latitude for the exercise of its ability, it is confronted by a growing list of new laws, which, if continued long, will make it increasingly difficult for the officers to use their own discretion in shaping financial policies.

Therefore it is obvious that if industry is to regain the freedom necessary for successful financial management, it must be permitted to operate under laws more equitable than some of those enacted in recent years. This means that legislators must know more about the problems of industrial companies.

In this connection, it is evident to anyone who has spent considerable time in Washington that the majority of lawmakers thinks of industry in terms of the giant corporations. It is time that many senators and congressmen profess great concern for small business, but this attitude seldom results in legislation that benefits the management of small companies. Many laws are passed by congress with the support of legislators who think that in punishing large corporations they are protecting small companies. The contrary usually is true. Most of the acts designed to discourage "bigness" or to otherwise restrain the larger units of private enterprise actually bring more harm to the small companies than to the intended targets. The 1936 federal tax law, discussed previously in this article, is a case in point.

Laws which bear upon the financial condition of individual companies would be fairer if legislators could visualize the real make-up of American industry. The United States census for 1929, which reflects conditions before business felt the effect of the depression, showed the following distribution of manufacturing establishments according to value of products.

Value of Products	Number of Establishments	Per Cent of Distribution
$1,000,000 and over	11,763	5.6
$500,000 to $1,000,000	10,395	4.9
$100,000 to $500,000	44,153	20.9
$20,000 to $100,000	75,225	35.7
$5,000 to $20,000	69,423	32.9
$5,000 and over*	210,959	100.0

*The census does not include companies reporting products valued at less than $5000 annually.

This shows that about 95 per cent of the companies each do a business of less than $1,000,000 per year. These companies employ about 42 per cent of all the employes in manufacturing and produce about 33 per cent of the total manufactures, measured in dollar value.

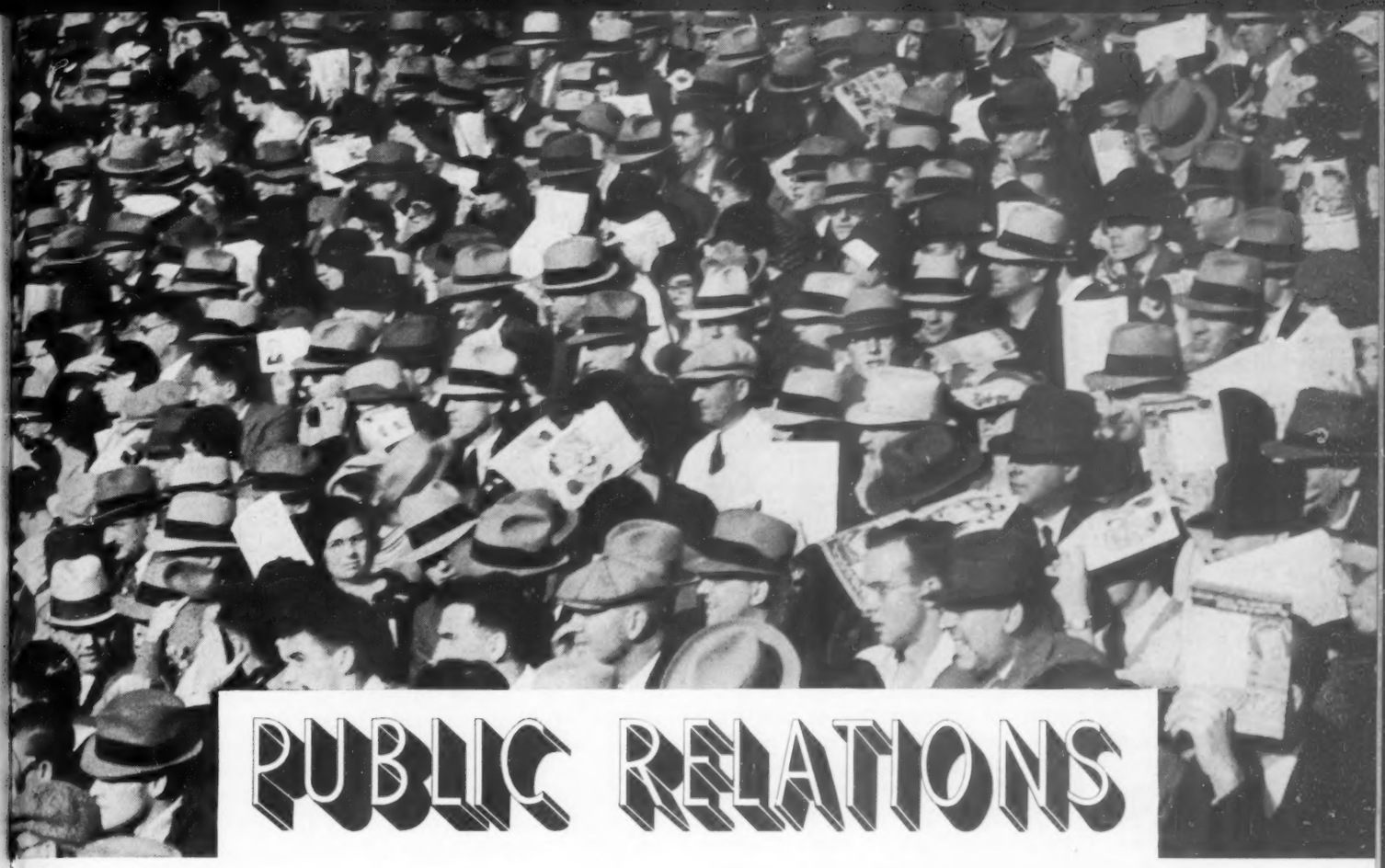
It would seem reasonable that this substantial portion of the manufacturing industries should be given greater consideration when federal legislation is being enacted. At present, much of the emphasis in tax matters, in questions of trade practice, and in interpretations of anti-trust laws is placed—not upon their probable effect upon this 90 per cent of the companies, nor even upon hundreds of establishments above the million-dollar mark—but upon their import to a comparatively few gigantic corporations whose annual business runs in the hundreds of millions of dollars.

When legislation affecting finance and industry is under consideration it is only natural that its influence on the large units should be studied. But at the same time there should be a sufficient number of congressmen sincerely interested in the affairs of small business to see that the laws do not react against the little fellow.

This situation will not be remedied until business leaders themselves understand more fully the important role of the small manufacturing establishment in the economic structure of the nation. Many of the powerful trade associations which represent industrial groups in their relations with the government and the public make the mistake of placing too much emphasis upon the problems of the large member companies. Some of their officers do not realize that by scaling down their appeal to correspond to the needs of the average member—the company of small or moderate size—their service to all members, large and small would be much more valuable.

Championing the cause of the typical industrial concerns, rather than the exceptional and spectacular ones, will help to solve many of the present problems of industry. Certainly it will help improve the conditions which affect the ability of the individual units to chart a safe course on the treacherous seas of finance.

WHO gets the cash from American industry? This chart, prepared by the National Industrial Conference board, and showing the apportionment of total manufacturing income of $11,750,000,000 in 1935, throws some light on the question



PUBLIC RELATIONS

AMERICAN industry—or rather the management of industry—is in dutch with a large portion of the nation's citizenry. Industrial executives are confronted with a difficult task in rewinning public esteem, in regaining appreciation for industry's achievements and in proving the progressive element among industrial leaders is in sympathy with social objectives which public opinion has approved.

Perhaps it is overstatement to say better public relations are essential to industry's preparedness for real prosperity. Conceivably industry can enjoy a fair measure of activity and yet remain at odds with the man in the street. But in the long run, industry sorely needs the appreciation and approval of the people. Without this, industry cannot hope to receive fair treatment at the hands of the legislators of federal, state and local governments, who, in the final analysis, are obliged to act in accordance with the will of the public.

It may be true, as one public relations expert has said, that "an industry's public relations, like one's family relations, are an intangible which we endure or seek to improve but about which we do not talk." But among ourselves—within the councils of industry—it is high time we give adequate consideration to the relation of industry to the public.

True, the one-time popular "public-be-damned" attitude has few proponents today. Nevertheless the majority of executives are so busy with the routine of their businesses they have failed to sense the real importance of the public's conception of industry and its leaders. Even those few who appreciate the power of public opinion are somewhat vague in their ideas of procedure. Of the scores of progressive industrialists who seek to improve public relations, less than half a dozen know the technique.

At this point something should be said for the public relations experts, who, hired to court public favor for their clients, labor under such stringent restrictions that few of them have ever had a real chance to prove their worth. Some of them, if accorded the sterling support which Charlie Michelson receives from his political clients, would make enviable records comparable with his. But much of the work of industry's public relations specialists is ruined utterly by the antiquated practice of submitting all releases to legal counsel, which means, in most cases, that anything of human interest which appeared in the original copy, is deleted before it greets the eyes of the public. A release that has passed through the legal sieve usually is as readable as a telephone directory.

However, the publicity of industry is but one angle of the public relations problem. The most effective work is done within the confines of an industrial community. If every company could contrive, by its everyday acts, to stand well with the people in the immediate locality, there would be little need of national programs to win public approval.

This point is emphasized by Virgil Jordan, president, National Industrial Conference Board Inc., New York, who has some interesting comments on this subject: "I feel that in the years that lie immediately ahead, industrial management can and should give intensive and intelligent attention to the task of establishing contact and building co-operation with the public at those points where it is most likely to be effec-

tive, in the light of the whole situation which confronts industry. To my mind this means, specifically, the shop, the plant, the concern, the local community. It is at these points of contact that the reconstruction of public goodwill and understanding toward business as a whole is most likely to be begun. For this purpose the most careful study of problems of company industrial relations and of community contact is indispensable; and every concern, large or small, should develop the means for systematic attention to these problems, in many cases, and wherever possible, through some important executive of the company, to whom this responsibility is specifically delegated.

"This does not mean, however, that everybody else in the company can forget the job. Rather, every part of the management from the board of directors down must have it constantly on their minds.

"For the rest, the less participation in politics, and the less large-scale ballyhoo and goodwill propaganda on the part of industrial management, the better."

Regarding the matter of participation in politics, there are some who maintain that industry should have a very vital concern in local poltics, for here is really the cradle of all politics, and if it is ever going to be possible to raise the caliber of the people's representatives in national politics, it seems logical to start the job at home with the hope that the movement will spread eventually.

DEFINITELY, an awakening of management to the importance of keeping the public informed correctly about industry is in progress. Probably more than ever before, organizations are setting up public relations and industrial relations departments. Leading colleges and universities are sponsoring lecture courses in these subjects which are being attended in large numbers by representatives of industry.

One of the country's leading counsels on public relations, Edward L. Bernays, has a number of pertinent observations to make, as follows: "This year promises to see a great advance in appreciation by industry of the importance of its relations with the public, and the vital necessity of selling business itself, as well as its products, to the American public.

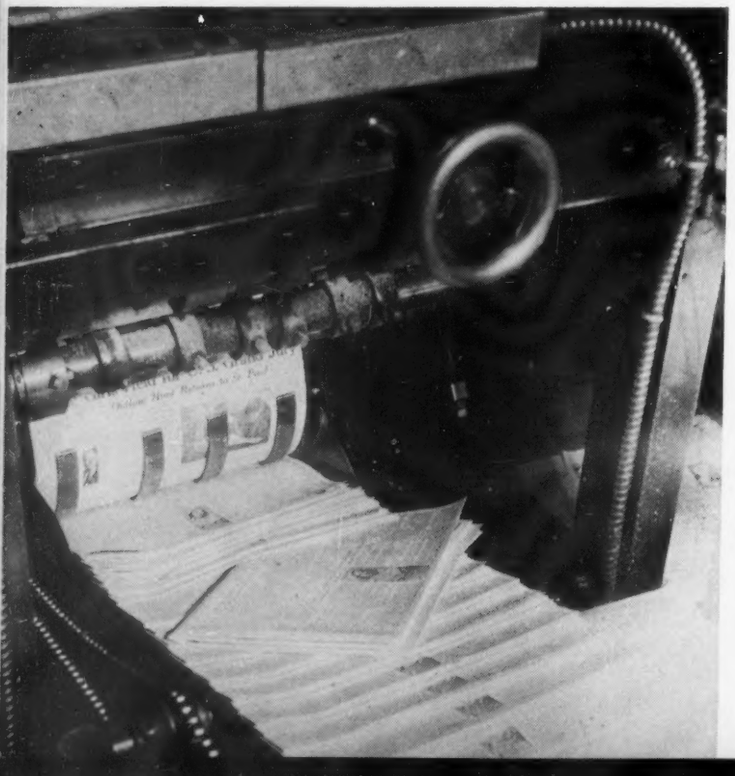
"Considerable advance along these lines was registered last year. During the depression, industry awoke to the realization that if it was to maintain its place in the American system, it must re-establish and restate many important phases of its own existence. For example:

"The importance of always adhering to the principle that, to survive, private business must always be in the public interest.

"That the public interest is a changing concept and business must change with it.

"That the place of business in the American system must be sold to the public, and that public relations techniques can help to do this.

"Business is now moving to consolidate its position in this regard. Notable was the recent speech of Colby M. Chester, president of the National Association of Manufacturers, before the Congress of American Industry, in conjunction with the recent annual convention of the National Association of Manufacturers. Mr. Chester stressed both the growing social consciousness of industry, and the necessity of telling the public industry's story.



Size of Plant No Measure of Need

"There is no industry or business or plant so small that it can afford to disregard the principles of good public relations, whether or not it engages outside assistance in formulating public relations policies. However, small business generally is in closer touch with the public it serves, and therefore more likely to be able to interpret its desires.

"The complexities of large business, on the other hand, draw its heads further away from personal relationships with the workers and with the public, and the large business, therefore, is more likely to become an abstraction to the public and, as we have seen since the depression, an abstraction linked with unfavorable conceptions of power.

"Business has realized that trends toward government regulation are in reality an expression of the public mind on the subject of American business. But the public is prone to judge the whole of business by the acts of an irresponsible minority. Therefore, it is the *business* of business as a whole to see that it conducts itself with a due regard to the public's needs and desires, and to conform to its opinions and prejudices.

"Large corporations have expanded their public relations activities. United States Steel Corp., for instance, under the aegis of Edward R. Stettinius Jr., has appointed J. Carlisle MacDonald as its public relations officer. John W. Hill is in active public relations work for the American Iron and Steel institute; Merle Crowell, public relations officer for the Rockefeller Center interests; Arthur Page widened his sphere of usefulness for the American Telephone & Telegraph Co.; Paul Garrett enlarged his field of activities for General Motors Corp; Ivy Lee Jr. and T. J. Ross carried on along wider fronts for the Pennsylvania railroad; Northrup Clarey did public re-

lations work for Standard Oil of New Jersey; and R. Gordon Wasson for J. P. Morgan & Co., to mention only a few.

"If the public is to have confidence in business, business must take the public into its confidence. In a large sense, the public is a stockholder in every industry of which it consumes the product, and it is good business practice to keep one's stockholders informed.

"It is for the forward-looking elements in industry who recognize the prime importance of the public relations of industry, to educate those within the ranks of industry who do not as yet realize that the future of American industry and of the American system is bound up with the problem of 'selling' the American public on the contribution of sound business to prosperity."

INCIDENTALLY, Mr. Chester, whom Mr. Bernays mentions, propounded in his address a 12-point program summarizing his own views on industry's obligations to the public, as follows:

1. Industry must accept its responsibility for the national welfare as being an even higher duty than the successful operation of private business.
2. Industry must continue to fulfill its obligations to the public in making better goods at lower cost, thus raising the standard of living and keeping the door of personal opportunity open.
3. Put every possible employable in manufacturing industry back to work.
4. Keep its own house in order, exposing its policies at all times to public scrutiny.
5. Stand four-square against monopoly.
6. By its actions engender growing confidence on the part of workers.
7. Invite increasing public understanding of industry by telling the facts.
8. See that workers, management and investors, according to their contribution, share fairly in the proceeds of manufacturing.
9. Help to create economic security for all, preserving as well the opportunity for the individual to attain his own greater security.
10. Zealously live up to its responsibilities and insist that all other factors of our economic life, including labor organizations, be made equally responsible.
11. Make its co-operation available to government in a constructive manner at all times.
12. Join other business groups in studying the depression in order to minimize or avoid another one.

While this program represents "consummations devoutly to be wished," and met with widespread favorable reception, it suggests many problems which will require interpretation and analysis. For instance, what of the effect of the present uncontrolled and domineering actions of professional labor organizations? Uncurbed—and there appears to be little inclination on the part of the federal government to hold labor unions responsible for their actions—these labor groups might substantially wreck any proposed effort of industry to achieve these ends.

The National Association of Manufacturers is to be commended for its sincere efforts, through an industrial information committee, to create an intelligent conception of industrial activity in the minds of the public. The job ahead was ably summed up by Walter D. Fuller, president of the Curtis Publishing

Co., speaking before the National Industrial council in New York recently. He said: "Convincing the American public, especially that half of the public with incomes of less than $1000 a year, that it is doing a good job, is the necessity now faced by industry. Very definitely, if the American public is not given the opportunity to know and understand industry and management, then the future of our associations and our companies is not pleasant to contemplate.

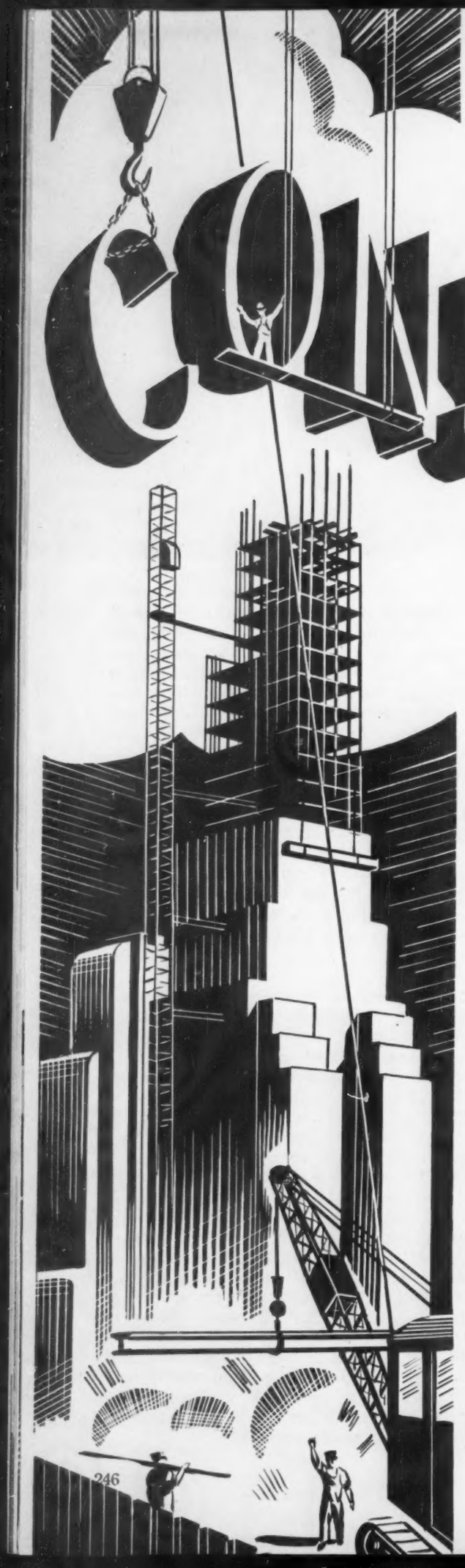
"Now, in thinking of this American public, we must not lose sight of this fact: It isn't what you are or even what you seem to be that counts with the other fellow; it's what he thinks you are. It is our job so to conduct ourselves and our industries that thumbs are up for all of us and then, when and where we know we are right, let's shout it from the housetops."

ACTIVE and aggressive proponent of enlightened relations with the public is the steel industry's Ernest T. Weir, chairman, National Steel Corp. Looking at the subject from the broad overall viewpoint, he asks: "Where does industry stand in the estimation of the American people? What changes if any should industry make in its attitude and methods in relation to great public problems? How should industry go about making these changes?

Analyzing these questions specifically in a recent address Mr. Weir points out that "today new things are expected of industry and of industrial leadership. Industry is expected to broaden its activity beyond the making and selling of goods. The industrial leader is expected to accept his responsibility not only to be an efficient producer and seller, but also to recognize the influence of his economic actions in social and political fields. Industrial leadership is expected not only to guide industry as the instrument for the making of all material things that people need, but in addition, to use industry as an instrument that will aid in solving the human problems

(*Please turn to Page* 412)

CONSTRUCTION



OF ALL the principal consumption fields for steel, the construction industry at the end of 1936 was still definitely among those having the farthest to go to overcome deficiencies incurred in the six lean years since 1930.

Although last year produced several significant trends, including a sharp upturn in industrial construction and the beginning of a return to state and local responsibility in municipal housing, it ended with no great progress achieved toward what many persons believe is the greatest problem—low cost private housing on a widespread scale.

Residential building, which in 1925-29 was nearly equal in value to industrial, commercial, utility and public works construction combined, is undeniably the field of greatest shortage. The unfilled demand is so great that even if the peak years of the 1920's were equaled in 1937 the deficiency still would be vast. And unless the steel house comes into use more generally than at present, the potential value of this extensive market may not be realized by the metal industries.

Volume of construction in 1936 throughout the nation represented a fair degree of recovery but the greatest advances are still in the future. Total value of construction contracts in 37 states in 1936 was approximately $2,680,800,000, compared to a 1935 total of $1,844,544,000. It was the first time in five years that these building expenditures had crossed the two-billion mark, and the total exceeded by $289,102,000 the 1930-1934 average of $2,391,698,000, but was considerably below the 1925-1929 average of $6,213,894,000.

A generous share of the improvement went to steelmakers. Increased demand from private sources for structural steel was notable. Industrial and commercial shape awards (over 100 tons) compiled by STEEL, showed a gain of 74 per cent over 1935, whereas

1935 showed only a 21 per cent gain over 1934.

But how about 1937? Over the nation, in all kinds of building, will 1937 show an astounding gain as some persons believe, a boom comparable to that which characterized the 1920's? Continued improvement is certain and the pace will be faster, but the building field's cycles do not always accelerate as swiftly as those of business.

This is borne out by a statement from Seth L. Schnitman, chief statistician of F. W. Dodge Corp., New York. Says Mr. Schnitman: "We believe the expansion that will occur in 1937 will be a healthy type, reflecting the satisfaction of real demands for space of all kinds, but for those who look for and budget on a total volume of construction in 1937 as great as was shown for the year 1930 a rude awakening probably is in store." Any boom comparable to the 1920's, he continues, may come two or three years hence, barring some unpredictable event such as war.

Unlike the false flurries which started several times during the depression and ended abruptly, expansion in the industrial, commercial and public utility fields apparently resulted from a more genuine need in 1936 and will continue to gain momentum in 1937. The steel industry itself, and the automobile, chemical, papermaking, glass and oil refining interests were the leaders. For steel mill expansion more than 71,000 tons of shapes was purchased; the automobile industry took 33,000 tons for its principal plant developments, and demand from some of the other industries was almost as heavy.

Virtually all this construction was of essential character, necessary through improved business conditions. Here is probably the most impressive feature of the year.

Office buildings and apartment construction showed improvement, with a volume of numerous smaller buildings replacing the void left by the absence of larger and more spectacular structures. Store modernization was unusually active. Notable also was the amount of bridge building and crossing eliminations, which consumed large portions of the total shape production. The $77,600,000 San Francisco-Oakland Bay bridge, which required 200,000 tons of steel, was completed after nearly 3½ years' work.

With late December estimated, fabrication and shipment of 1,500,000 tons of structural steel for the entire year appeared a likely figure, according to V. G. Iden, secretary, American Institute of Steel Construction Inc., New York. This was about 40 per cent over what was fabricated and shipped during 1935. He estimates that the volume of business in this industry during the current year may be 15 per cent over 1936, provided again nothing unforseen happens, such as a complete cessation of public works.

"The most serious check to the industry is threatened in the field of labor," continues Mr. Iden. "There is an unusual shortage of skilled workmen in the building trades. . . . This may not of itself check building, but it would increase costs and that in turn would check investments in new structures."

From the steel industry's standpoint as a supplier of heavy construction materials, as far as 1937 is concerned it is well equipped to take care of almost any reasonable increase that may be shown. The quality of the steel has been improved steadily. The industry has ample capacity—some 5,200,700 gross tons a year for heavy structural shapes alone—to take care of the influx in demand.

In the residential field it has the capacity also, but

Value of Construction Contracts

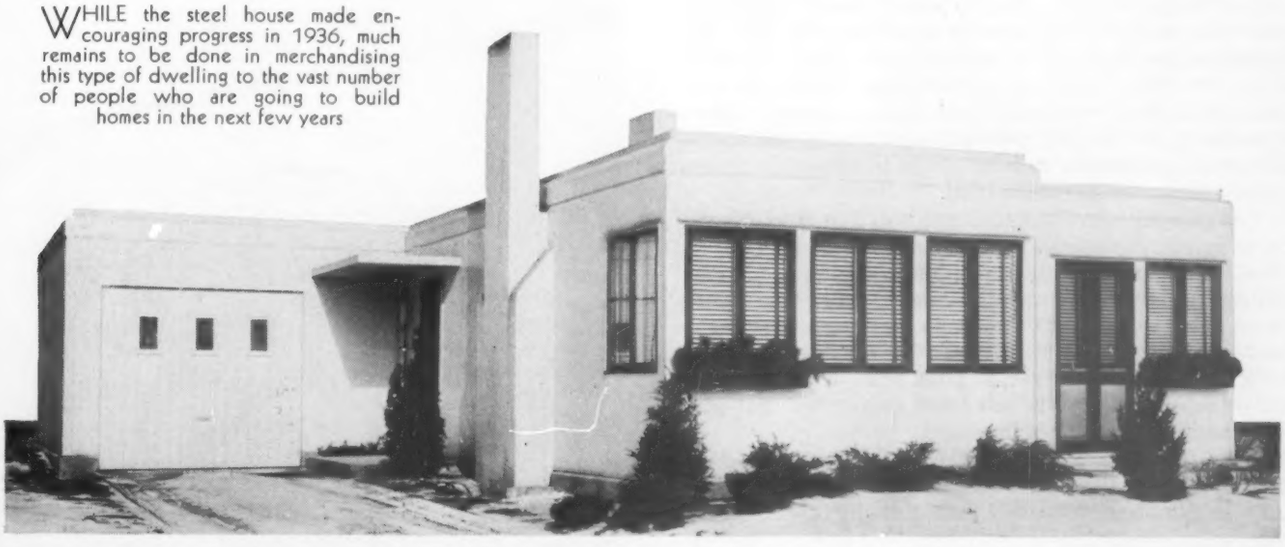
37 States; in dollars; 000 omitted

(F. W. Dodge Corp. Reports)

	Total*	Residential	Commercial	Industrial	Public w'ks and utilities
1925	6,006,426	2,747,729	872,443	326,613	1,065,947
1926	6,380,914	2,671,120	920,890	471,249	1,340,351
1927	6,303,055	2,573,316	932,911	375,910	1,381,973
1928	6,628,286	2,788,317	884,609	508,840	1,464,480
1929	5,750,790	1,915,727	929,188	545,861	1,458,992
5-year av.	6,213,894	2,539,242	908,008	445,695	1,342,349
1930	4,523,114	1,101,312	628,809	256,632	1,651,238
1931	3,092,849	811,388	311,105	116,157	1,171,115
1932	1,351,158	280,067	122,718	43,490	590,301
1933	1,255,708	249,262	99,371	127,517	602,722
1934	1,543,101	248,840	150,595	116,078	751,236
5-year av.	2,391,698	538,174	260,023	131,975	953,322
1935	1,844,544	478,843	164,479	108,858	690,213
(11 mos.) 1936	2,475,600	736,136	225,979	174,880	859,160

*Includes public buildings and all types of institutional buildings not separately shown in this table.

WHILE the steel house made encouraging progress in 1936, much remains to be done in merchandising this type of dwelling to the vast number of people who are going to build homes in the next few years



here the question of marketing its material becomes more important. Particularly is this true in regard to the steel house which, speaking on a broad scale, has been pushed forward none too successfully since its inception, yet which offers a potential yearly market for more than 2,000,000 tons of steel, on the basis of 600,000 dwellings needed annually.

In each year from 1925 to 1928, inclusive, residential building in 37 states totaled in excess of $2,500,000,000, but in 1934 it dropped to only $248,840,000. Last year the value of contracts was close to $800,000,000.

Estimates of the number of residences now needed vary widely, ranging from one million to as high as five million. The number of houses erected in 1937 probably will not exceed 400,000. Most authorities agree that the field requiring the greatest attention is that in the $2000-$3000 class, since the annual income of nearly 60 per cent of the nation's families does not exceed $2000 a year even in prosperous times. The building industry has not succeeded in reaching the bulk of these families with suitable housing.

Less than a thousand prefabricated steel houses have been erected in the last six years and a survey by STEEL recently among some of the representative manufacturers indicates that only about 250 were constructed in 1936. The number of new houses using steel in part of the frames has been increasing steadily.

The fact that more prefabricated houses have not been sold is no reflection upon the efforts of those persons actively engaged in that field. Some of the deepest thinking in both the steel industry and the construction industry, some of the best engineers and some of the keenest marketing experts are engaged on the problems.

Education of Public Is Prime Need

The chief task centers in educating prospective home buyers in the advantages of steel housing and in attaining a reasonably low price for the quality. Some progress has been made in overcoming the box-like appearance of early prefabricated residences but more of this must be done. It is felt by some persons that the problems of proper insulation and the elimination of condensation must be solved once and for all before the steel house can be developed in a satisfactory manner.

Confidence in the prefabricated house must be established, then. It must be made known that the prefabricated house is a better house than the ordinary structure built of conventional materials and that it is less expensive and more lasting. Merchandising is the big problem and every assistance the small fabricator can be given is likely to be returned in tonnages some day.

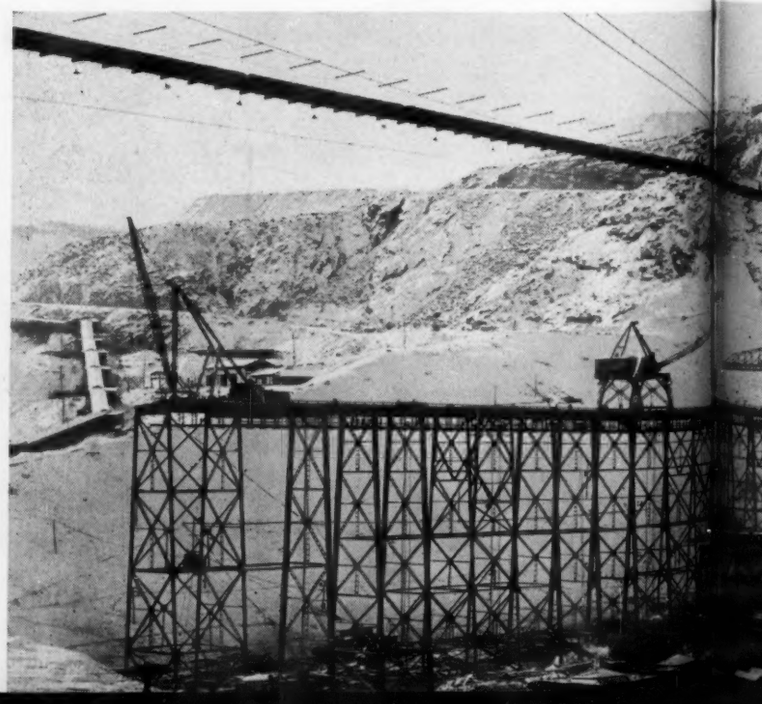
Encouraging developments are noted in steel houses nonetheless. One was the construction of a house of steel built for $4990 in 75 working days for the Purdue university housing research project. Labor costs, $1271, were estimated to be approximately 5 per cent lower than in a house of wood and stucco, which cost $4852 and was erected in 96 working days. Other developments included the encouragement given by some leading steelmakers.

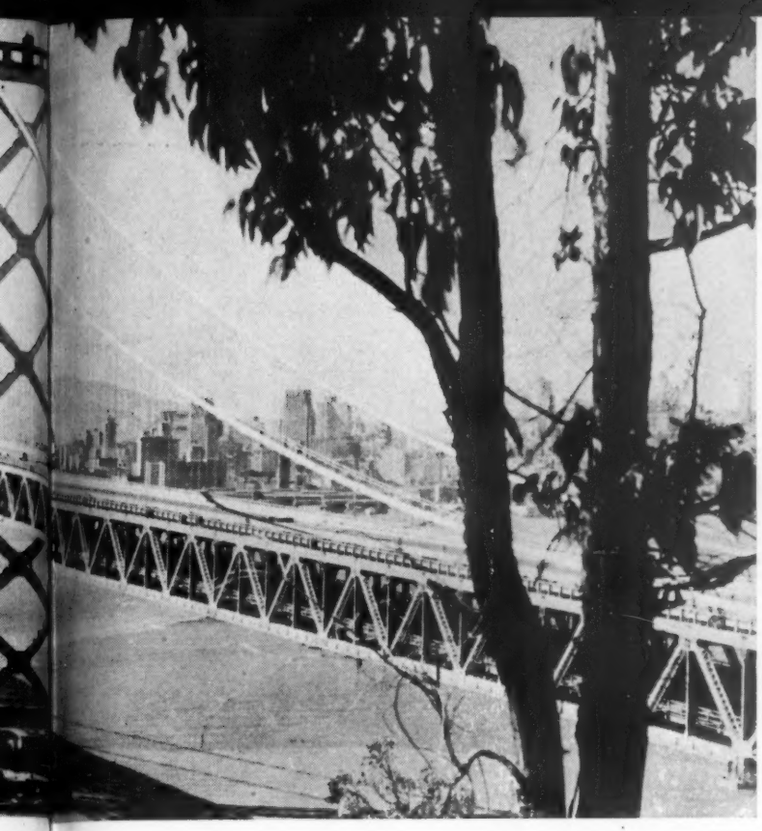
"The future demand for strip steel," declares Tom M. Girdler, chairman of Republic Steel Corp., "not only in the structure itself but in cabinets, cupboards and other accessories, will open a market tomorrow that will rival the automobile market today."

SOME 200,000 tons of steel went into this huge 77-million dollar San Francisco-Oakland bay bridge, completed last year after 3½ years of construction work. This view is from Yerba Buena island, with San Francisco in the background

One building material which will be heard from more frequently in the next few years is metal lath. Estimates of the 1936 business of the members of the Metal Lath Manufacturers association show that a larger volume of this material was distributed in 1936 than in any year since 1929. In fact the total was estimated at not far below the aggregate for the entire years 1932-1933 and 1934. Recently the manufacturers adopted a simplification to reduce the number of varieties carried in stock by dealers.

Reinforcing steel touched its low point for many





years in the spring of 1933. For that year total production of this material stood at 415,000 net tons. Since then volume has climbed steadily and in 1936 consumption was more than 50 per cent above 1933.

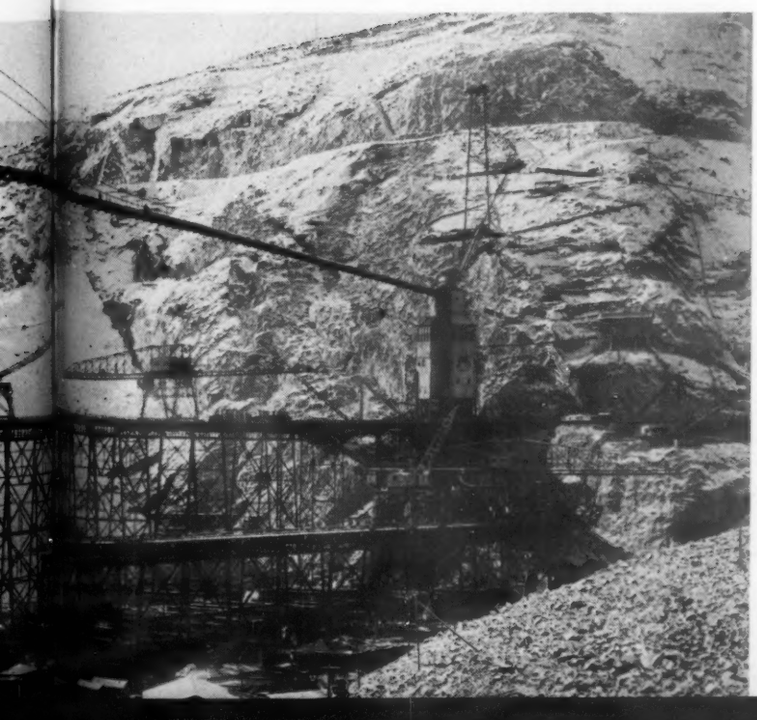
From the standpoint of tonnages, the outlook for reinforcing steel is decidedly encouraging. However, it is believed by some the marketing situation needs to be improved. The industry is said to suffer from overexpansion in sales outlets, one of the ills inherited from the days of NRA. This, in turn, has resulted from unsound marketing practices.

Recent years have witnessed the acquisition by producers of several of the larger independent distributors and with it a shifting of balance within the industry. Reinforcing bars in recent years have been used almost exclusively in government projects or in projects financed wholly or in part by federal aid. This picture is changing gradually and the year 1937 probably will see a marked increase in the development of private enterprise.

Any attempt to estimate what the federal government's spending program has meant to the iron and steel industry in the last few years leads into a maze of figures, many of which it is almost impossible to break down accurately. The whole value of the government's programs is a debated subject, with many persons holding public works have been far below normal requirements of this country because the government's first concern has been to provide wages for the unemployed, other persons asserting private enterprise has been hampered.

It was recently announced that PWA, which had its inception in June, 1933, had spent $336,814,082 for iron and steel products, not including machinery, up to June, 1936. Among the larger expenditures were $123,344,276 for structural and reinforcing steel; $32,859,494 for cast iron pipe and fittings; $21,554,268 for heating and ventilating equipment; $22,261,673 for steel rails; $10,692,815 for metal doors and sash; $6,505,793 for forgings, iron and steel; and $9,084,251 for miscellaneous hardware. Machinery, not including transportation equipment, was estimated to have cost $236,739,241 in the three-year period, while transportation equipment, including locomotives, freight cars and trucks, cost $89,136,986.

BUDGET of the federal government for 1936 included over $20,000,000 for Grand Coulee dam which is shown here in the early stages of construction. The large trestle is for pouring concrete, and is embedded in the dam structure as the latter is built up



Government Millions Spread Nation-Wide

Expenditures by the government in the fiscal year 1934 and 1935 included such items as: Boulder canyon, $43,220,507; public highways, $585,256,940; rivers and harbors, $220,424,751, and loans to states and cities $216,307,417. Included in the 1936 budget was $20,750,000 for Grand Coulee, $9,600,000 for the Boulder dam power plant; $300,572,300 for flood control; $6,500,000 for the All-American canal project; $300,000,000 for continuing the PWA program of nonfederal projects, and $486,000,000 for a program of highway construction including $100,000,000 for grade crossing eliminations.

Tennessee Valley authority, operating since 1933, had received $113,000,000 up until last July, exclusive of a $50,000,000 bond issue. Total expenditures up to that time were in the neighborhood of $100,000,000. First power from the Norris dam was generated last July and the Wheeler dam began generating power on Nov. 1.

In connection with dam construction, it is interesting to note some engineers believe the nation is approaching the end of a dam construction period which is not likely to be duplicated for many years. They point to the completion of the Boulder dam project, and the approaching completion of Grand Coulee's base section and the Fort Peck project. By the end of 1938 nearly a score of smaller dams will be completed.

Work on the Mississippi river consumed large tonnages of steel piling last year. Construction was under way on 171 rural electrification projects for which REA had allotted $35,728,178. The navy's unusually large shipbuilding program fell more in 1935 than last year, but two new battleships will be constructed in 1937, according to present plans.

RAILROADS

A YEAR ago these columns applied the statement that the railroads were coming back. Records of today give conclusive proof that in freight and passenger traffic, earnings and equipment orders the country's leading form of transportation has done much to fulfill this prediction. But much more work remains to be done.

Improved business conditions, of course, accounted largely for the recovery in railroad earnings and for the sharp comeback in equipment buying. Traffic increased, more cars and locomotives were needed, and with loadings bringing better income more money was in sight to buy rolling stock.

At the same time there is pronounced evidence of a more aggressive and progressive attitude on the part of railroad management in seeking business through the medium of improved service. Such an attitude, supplanting the *laissez-faire,* bids fair to return to rail carriers a large share of prestige lost by them to competing forms of transportation. Already the steel industry and other suppliers of raw material for railroad equipment have recouped considerable business lost during the depression when carriers were forced to retrench in a manner eclipsing anything experienced in the past.

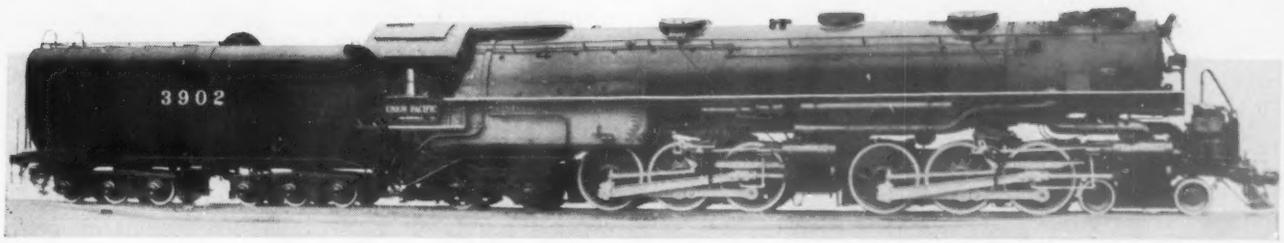
It is not to be inferred, nor do railroad men maintain, that their facilities have been bolstered sufficiently, through recent repairs and additions, to accommodate further marked gains in calls for services. More freight cars are needed, many old and inefficient locomotives must be replaced, and tracks must be attuned to the heavier demands which new traffic conditions impose.

How much additional equipment will be purchased in the next several years is a question with a variable answer. In the first place, it is difficult to determine how far traffic will soar during the present period of business improvement. Secondly, some roads must regulate capital expenditures according to financial position, and many lines admittedly still are in a state of convalescence and will require some time before the ravages of the depression have disappeared. Lastly, the carrying out of proposed labor legislation would seriously impair the amount of money railroads will have available for improving facilities.

Railway operating expenses, which include purchases of equipment, vary directly with the trend in operating revenues. Drop in gross revenue between 1929 and 1933 was more than 50 per cent—by far the largest reduction experienced during any of the five major depressions in this country. The situation called for retrenchment, and it was applied with a vengeance. In the five years, 1930-1935, class I railroads made an aggregate reduction in expenses amounting to more than ten billion dollars, compared with the 1929 rate.

Many of the economies effected in recent years are permanent. In track work, for instance, it was formerly common practice to protect end-battered rails by taking up damaged sections, sawing off the ends and relaying them in secondary tracks. Now the worn ends are built up by welding, and the life of the rail is extended about one-third. The steel industry is adding further life to rails by its new normalizing process, coupled with treatment of the ends which reduces the tendency to batter at those points.

Frogs and switch points also are renewed by weld-



TWELVE-WHEEL freight locomotive built last year by American Locomotive Co. for the Union Pacific. Maximum tractive power is 97,400 pounds

ing when worn instead of being scrapped as in the past. Lengthening the standard rail has reduced the cost of track maintenance, an important saving since fully 50 per cent of the total cost is incurred at the joints. Treatment of ties and bridge timbers has nearly tripled the life of such material. Mechanization of track work has resulted in a saving of about two-thirds of the former cost of laying rails. More efficient methods also are being employed at shops in the repairing of freight cars and locomotives.

A similar trend has prevailed in equipment design, and while this tendency was stimulated by the depression, it had been going on prior to the period of emphasis on cost reduction. Average tractive power of locomotives, for example, has increased about 50 per cent the past 20 years, while average freight car capacity has risen more than 15 per cent since 1916. Coal consumption by locomotives in freight service per ton-mile has been reduced more than 25 per cent since 1922, and the average speed of freight trains nas been stepped up nearly 50 per cent in the same period. Since 1929 the average speed has been raised more than 20 per cent.

Contribute To Reducing Dead Loads

Steel producers have made another important contribution to lower operating costs through the development of low-alloy high-tensile steels. While only recently adopted for equipment building, these steels offer a major economy by reducing the weight of freight cars, thereby increasing their pay-load.

It is only natural, therefore, these various savings should be reflected in the steady decline of unit cost of railroad operation. In 1921 it cost carriers $10.78 to move a ton of freight 1000 miles. In 1929 the operating cost was $7.44. Despite the decrease in volume thereafter, the cost was reduced to $6.63 in 1935. Further savings should accompany the current and prospective upturn in traffic and should be a vital factor in improving the financial position of the roads.

The larger carrying capacity and increased speed of handling freight cars must be considered in attempting to evaluate the railroads' need of additional equipment. It is apparent, however, the present supply is inadequate and that average quality is questionable when viewed in the light of heavier traffic which appears in prospect for coming years.

Late last year class I roads owned approximately 1,775,000 freight cars, a slight decrease from the year before, despite the better activity in repairing old units and building new ones. This was 500,000 cars fewer than in 1929 and, in addition, the percentage of unserviceable units had increased from 6 per cent seven years ago to 14 per cent. The same railroads had about 45,000 steam locomotives, a decrease of 1500 from 1935 and 12,500 less than in 1929.

Heavy Car Replacements Impending

Freight car loadings in 1936 averaged about 685,000 cars weekly, compared with 606,000 cars in 1935 and 1,014,000 cars in 1929. In other words, 31 per cent less freight, compared with 1929, was being accommodated with 22 per cent fewer cars. When the bad-order cars are eliminated from both years, however, the decrease in available units since 1929 is nearer 30 per cent. Furthermore, the average age of present equipment is such that efficiency dictates the replacement of a substantial amount. About 40 per cent of all freight cars are more than 20 years old, and 20 per cent are more than 25 years old. Many of these cars are unsuited for modern transportation conditions.

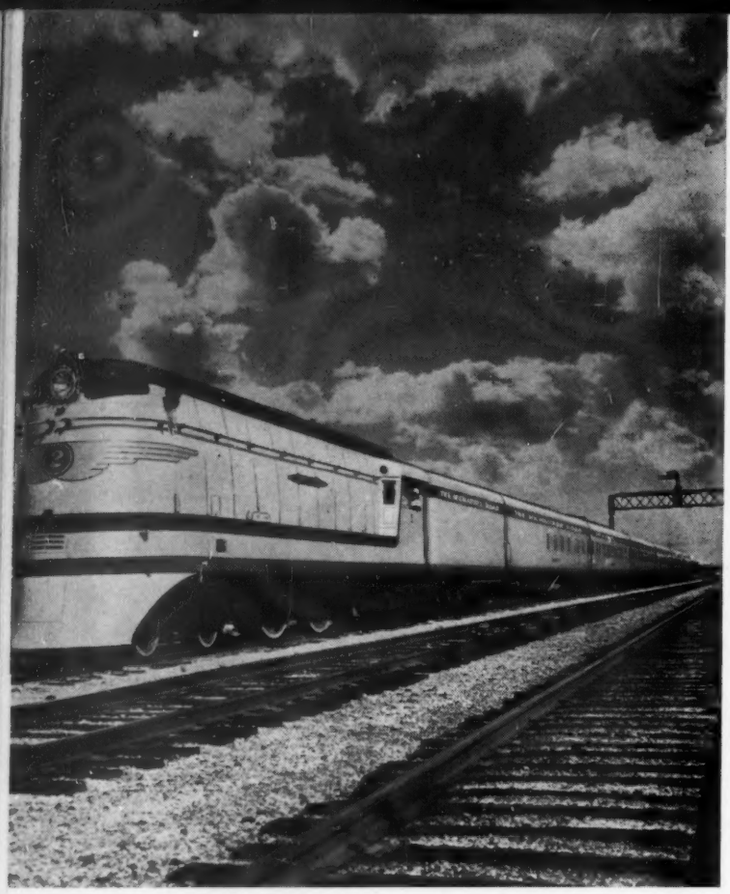
The need for replacement of old locomotives is even more crying because of economies incorporated in newer designs. Two-thirds of the motive power of the railroads is over 20 years old. Since the substitution of modern engines in many instances will pay for itself through savings in operating costs, it is likely the recent revival in locomotive buying is only a start toward more extensive modernization of motive power.

The fact that occasional signs of shortages of cer-

Eight Years of Railroad History

	Weekly average car loadings	Railroad net income (in thousands)	Freight cars owned by Class 1 roads	Locomotives owned by Class 1 roads	Freight cars ordered	Production of rails and accessories (tons)
1929	1,014,000	$896,806	2,277,505	57,571	106,105	3,646,941
1930	879,000	523,907	2,276,867	56,582	45,146	2,479,623
1931	713,000	134,761	2,201,510	55,149	10,694	1,547,330
1932	520,000	D 139,203	2,144,730	53,316	1,739	550,481
1933	560,000	D 5,862	2,034,886	50,903	2,460	612,831
1934	591,000	D 16,887	1,938,362	48,304	23,829	1,316,748
1935	606,000	7,539	1,835,736	46,594	19,308	979,615
1936 (Est.)	685,000	200,000	1,770,000	45,000	70,000	*1,200,000

*Ten months.



THE HIAWATHA of the Milwaukee road, one of the new streamlined trains which have been responsible for a revival in passenger rail traffic. Late last year a new and larger train was placed in service to supplement the original Hiawatha

tain types of cars occurred last year lends emphasis to the need for prompt additions to rolling stock. Some estimates call for a further gain of 10 per cent in car loading during 1937, or a weekly average of about 750,000 cars. The peak in loadings occurs during the fall; consequently equipment bought late last year will be available when demand is heaviest.

Financially, the railroads in 1936 had the best year since 1930. Gross revenues were up an estimated 17 per cent over 1935. Net operating income rose 35 per cent, while estimated net income of $200,000,000 compares with $7,539,000 in 1935 and with deficits in the three preceding years.

Purchases of iron and steel products and equipment also go back to 1930 for comparable totals. Mills turned out 1,200,000 tons of rails and fastenings in the first ten months, compared with 979,615 tons in all of 1935. Heavy contracting last quarter for 1937 track material needs points to a further gain in production this year. Freight car purchases of about 70,000 units were more than three times the 1935 total and the heaviest since 1929. Locomotives ordered numbered more than 400, compared with 83 in 1935.

Travelers Like New Passenger Trains

Developments in equipment design last year principally concerned motive power and the application of high-tensile steel to cars and locomotives. Diesel-electric locomotives, either placed in service or under construction by railroads and industrial transportation companies, totaled more than 50 last year, or about double the 1935 number. The tendency toward units of higher horsepower continued. Two diesel-electric locomotives of 5400 horsepower each were ordered for passenger trains to be operated jointly by the Chicago & North Western, Southern Pacific and Union Pacific railroads. The Union Pacific also ordered a new type of locomotive, known as the steam-electric. It has boiler, steam turbines, electric generators and motors.

Favorable public response to the fast, streamlined passenger trains prompted the building of additional units by a number of roads, particularly by western carriers. Better equipment and lower fares continued to hold the trend in passenger traffic upward.

Railroad labor is seeking a 6-hour working day at 8 hours' pay. While such a measure would absorb a large portion of the more than 500,000 employes who have been dropped from the railroads' payrolls since 1929, it would be a hard blow not only to earnings, but also to rehabilitation programs. To pass on the 33 1/3 per cent increase in costs to shippers would mean prohibitively high freight rates.

If the railroads as a whole are not back on their feet, they are at least off their backs. The work of restoring facilities to meet more exacting demands of modern times undoubtedly will proceed apace with the trend in general business activity. This should mean the heartening gains in railroad consumption of steel and other materials in 1936 will be duplicated, and more likely bettered, during the coming several years.

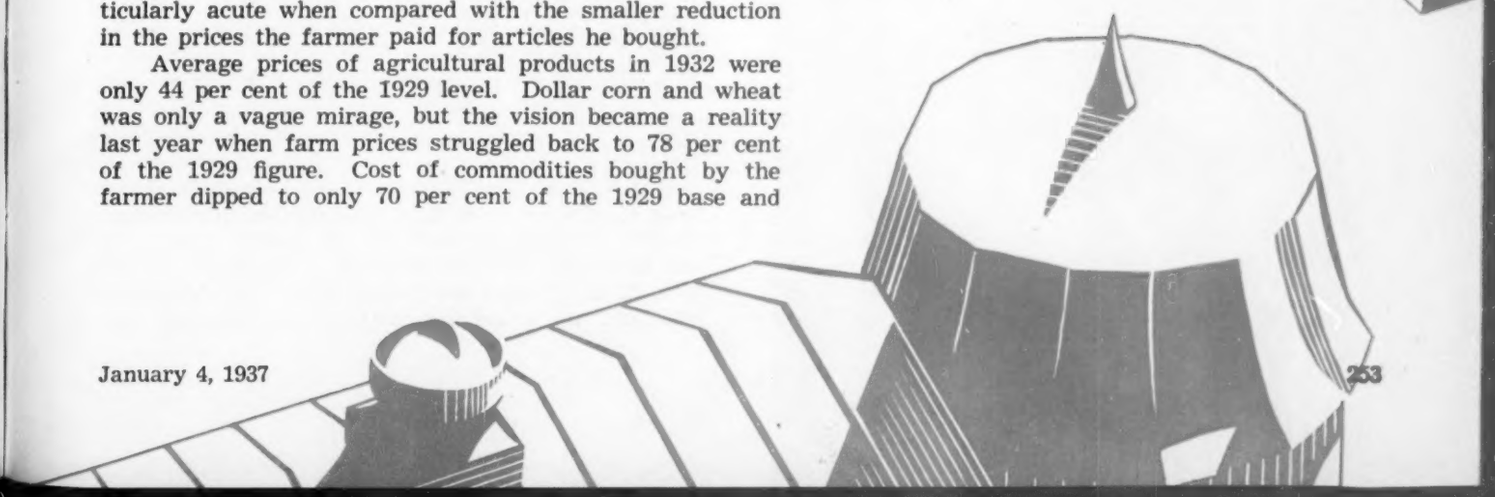
AGRICULTURE

DESPITE another stern, and sometimes losing, battle with the elements last year, agriculture as a whole aided materially in improving the picture of general business recovery registered during the year.

The farmer went far down the depression road before he started to climb out in 1933. Measured by farm cash income, he is more than half way up the hill he descended in 1930-1932. Of equal importance last year was further correction of the misalignment existing during the depression between prices agriculture received for its products and prices paid for commodities required for farm operation and family maintenance.

As indicated by an accompanying table, cash income from marketing in 1932 was only slightly more than 40 per cent of the 1929 figure. Four years of improving conditions brought the estimated 1936 income to 75 per cent of the 1929 total. This gain has been largely the result of the upturn in prices of farm commodities which had dropped to ruinous levels in 1932. This decline was particularly acute when compared with the smaller reduction in the prices the farmer paid for articles he bought.

Average prices of agricultural products in 1932 were only 44 per cent of the 1929 level. Dollar corn and wheat was only a vague mirage, but the vision became a reality last year when farm prices struggled back to 78 per cent of the 1929 figure. Cost of commodities bought by the farmer dipped to only 70 per cent of the 1929 base and



since 1932 have snapped back to 81 per cent, but during the past three years there was practically a horizontal trend compared with the steady rise in grains, livestock and the like.

Considering marketing income and prices paid by farmers last year, 75 cents was received for each dollar received in 1929, but for each dollar it was necessary to pay in 1929 for the various commodities and services incident to farm operation, only 81 cents was required in 1936.

Estimated cash income of $7,800,000,000 last year was acquired with the aid of relatively small government benefit payments. Federal money paid to the farmer in 1936 was only about one-half the $558,000,000 issued the year before. The tide will turn in 1937, however, since distribution of grants under the soil conservation program, expected to total more than $450,000,000, was started late last year and the large bulk of this cash will gush forth during ensuing months.

Offsetting the decline in government benefits in 1936 was the farmer's share of the soldier bonus, estimated at nearly half a billion dollars. In addition to the income received from the marketing of farm products, agriculture receives a healthy sum from work done off the farms. Some light is thrown on this subject by a recent study of the National Industrial Conference board. The latter estimates that such income is well over a billion dollars.

This same survey makes available farm income figures which are more nearly comparable with estimates of income for workers in other industries than have heretofore been available. The net occupational income of farm operators in 1929, including the return from both on and off the farm—and with income in kind valued at retail prices—averaged between $1310 and $1349, according to the Conference board's study. In the same year the occupational income of all other gainfully occupied persons was between $1391 and $1397.

Average net farm income in 1935, excluding government rental and benefit payments, was between $873 and $919. This compared with average income of $1041 for fully-employed wage earners, disregarding the unemployed, in manufacturing.

The comparison varies by sections of the country, however. Farmers were as well off as manufacturing wage earners in New England, Middle Atlantic states and East North Central states, while in the mountain states and on the Pacific coast, net farm income was materially higher than that of wage earners. Farm income for the country as a whole is materially lowered by the concentration of 54 per cent of all farm operations in the South and generally low income conditions in that area.

Another enlightening study of farm income was undertaken by the Farm Equipment institute to determine monthly variations. It was found that the flow differs according to the geographical section. For the entire country February brings the low of 6.6 per cent of the year's income, while October is the month of largest return with 11.7 per cent.

The 1936 drought was both unexpected and crippling. Its effect was less harmful than of 1934, however, and while it spelled ruin for many farmers, it also was responsible for higher prices which meant prosperity for those whose crops were undamaged. Uncertainties created by the drought curtailed sales of tractors and farm implements in certain districts, though production of agricutlural equipment for the year was well ahead of that of 1935. The gain, estimated at about 20 per cent, brought domestic sales close to the 1930 level.

Business in the domestic equipment market last year was about 80 per cent of the 1929 volume, compared with only 25 per cent at the ebb of the depression in 1932. Export trade increased more rapidly in 1936, being about 35 per cent ahead of 1935. Foreign markets shriveled during the drab 30's, however, and despite a quickening the past four years, 1936 business abroad represented only 42 per cent of the 1929 volume.

It is apparent agriculture as a whole is far from being equipped to operate near the point of efficiency possible through general use of modern equipment and up-to-date farming methods. The record of implement and tractor sales alone shows the depression has built up a bulging backlog of potential pur-

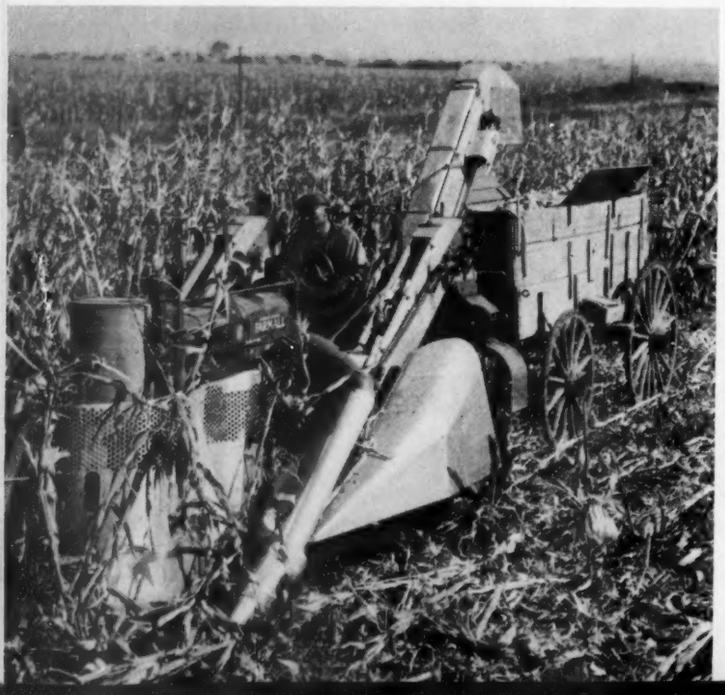
How the Farmer Has Fared Since 1925

(1929 = 100)

	Farm cash income*	Prices received by farmers*	Prices paid by farmers*	Domestic farm equipment sales
1925	98.7	107	103	74.2
1926	95.3	100	101	79.5
1927	95.6	95	100	85.3
1928	97.5	102	101	88.0
1929	100.0	100	100	100.0
1930	80.8	86	95	83.2
1931	51.3	60	81	46.8
1932	41.2	44	70	25.6
1933	48.8	48	71	26.2
1934	60.9	62	80	44.4
1935	67.8	74	82	65.7
1936 (Est.)	75.0	78	81	80.0

*From statistics of Bureau of Agricultural Economics.

BUILT chiefly of steel, this two-row corn picker enables two men to pick and husk as much corn as 16 hand huskers of average skill



SMALL combine, designed to extend the economy of the harvester-thresher to crop growers of limited acreages, has helped to swell demand for this type of equipment. Tractor sales also have been aided by development of smaller units

chases, reduced but little by the improved conditions of the past 12 months.

Had the farmers, since 1930, bought equipment at the same rate that they did in the six years 1925-1930, their purchases would have totaled one billion dollars more than the actual sum. Manifestly, many implements now worn out have not been replaced.

A wide variation exists in production costs of different farms; hence the net return to an individual farmer is dependent not alone on the prices of the commodities he sells, but also on the methods and equipment he employs. Government research has shown that even on land which might be classed as submarginal, profitable operations are being conducted because of efficient use of labor and equipment.

A major contribution of the farm equipment industry toward attainment of lower cost farming is its development of implements and tractors applicable to the small farm. The one-plow tractor has helped materially to swell tractor sales, since it can be used on the average type of farm of 50 to 100 acres, of which there are about 1,375,000 in the United States. Smallest tractors previously available were not economical for use on farms of this size.

Tractors constitute the major portion of all equipment sales. Government figures for 1935 show that more than 40 per cent of total sales involved tractors, while other equipment used with tractors raised the proportion to more than 50 per cent. It is estimated that about 1,500,000 tractors now are on farms, twice as many as in 1928.

Helping To Combat Ravages of Weather

The small combine is another unit which is finding a broader market because of its adaptability for use on limited acreages in harvesting small grains and other crops. This equipment brings to the harvester of 50 to 100 acres economies formerly reserved for larger farms.

Farm equipment manufacturers also have been active in the development of new implements and in improving older types, thereby giving further impetus to sales in coming years. One new adaptation is a basin-listing attachment, designed for use in drought-ridden districts and counted a valuable aid in preventing soil erosion. This equipment creates dams in the lister furrows to hold water, thereby permitting rain and snow to be absorbed by the soil rather than run off the field.

Rural electrification is being extended steadily and will be responsible for the creation of a billion dollar market for the electrical industry over the next decade, say electrical equipment manufacturers. Last year, nearly 100,000 farms received high-line service for the first time, bringing the number of electrified farms to nearly 1,000,000. If this number should be tripled over the next ten years, as expected, a huge market for various types of electrical equipment will be tapped. Bringing electricity to scattered farms is an expensive job unless sufficient power is consumed; this largely has been responsible for the apparent lag in farm use of electricity compared with the extensive urban application.

Potential Needs Are Substantial

Farm demand for wire products increased moderately last year, though sales were somewhat disappointing in that the drought curtailed buying in afflicted districts. As in the case of equipment, a substantial amount of deferred business has accumulated in barbed wire and fencing, and its release should accompany the return of better farm earnings. Another outlet for increased steel consumption on the farm is in building materials, a market which the steel industry is commencing to cultivate more intensively. Improved quality of sheets and developments in use of other steel products for dwelling and outbuilding construction will tend to promote their application to farm structures.

The 1937 outlook for the farmer is regarded as favorable, though the weather still is the big question mark and will have considerable effect on crops, prices and cash income. The United States department of agriculture forecasts at least a 10 per cent rise in national income, with which farm income is closely related. Higher prices are expected on farm products and commodities and services used by agriculture.

Domestic sales of farm equipment in 1937 seem likely to be the largest since 1929, possibly the best in history with the exception of that year. Another increase in purchases of wire products appears assured, while expenditures for other improvements to farming facilities and for home furnishings also should be heavier.

BANNER year in all history for the tin plate industry was 1936, with records established for both production and use which outran 45 years or more of the industry's existence.

Without final production figures, but gaged by reliable estimate, production of tin plate in 1936 rose to a figure closely approximating 51,000,000 base boxes. Comparative records show that in round figures some 39,000,000 boxes was the output for 1935, about 32,000,000 boxes in 1934 and 34,000,000 boxes during 1933.

Through this sharp improvement in 1936, the tin plate industry broke through its 20-year old upper-resistance level. Barring the two depression years of 1921 and 1932, output had ranged within the relatively narrow limits of 31,000,000 to 39,000,000 base boxes yearly.

Translated into tons of finished steel, the estimated 51,000,000 base boxes for 1936 amount to 2,550,000 tons, compared with 1,900,000 tons required for 1935 and 1,600,000 tons in 1934.

Fast-returning prosperity to the steel industry for the year just closed with the record of some 48,000,000 gross tons of steel ingots produced meant that despite the record use of steel for tin plate, the latter's percentage to all steel produced declined. The explanation of this showing lies in the relatively sharp recovery in building, railroad and automotive needs, all of which deal in heavier tonnage units.

Reducing the 48,000,000 gross tons of ingots to finished steel in net tons is done through allowance of 20 per cent loss in conversion of ingots to semi-finished, plus a 10 per cent loss in conversion to finished steel, resulting in a net estimated production of 34,500,000 tons.

The relation of 2,550,000 net tons of tin plate to this total shows that roughly one ton in every 14, or 7 per cent, of all the steel produced last year went into tin plate, which in turn obviously means 90 per cent containers. A 7 per cent showing in 1936 compares with an 8.5 per cent ratio in 1935; 8.68 for 1934; 12.25 for 1933; 10.79 in 1932; 7.90 for 1931; 5.77 for 1930; and 4.67 per cent of the total of all steel during 1929. Thus, in figures is borne out the time-tested conclusion that in boom times tin plate tends to take less of all the steel produced, but in lean steel years its relation to the total is imposing.

A year ago at this time output for 1936 was estimated conservatively low. The growing use of general line cans was indicated to require more than 1935's total but even the most hardy ventured an estimate of 45,000,000 to 46,000,000 base boxes. However, in the early days of 1936 the construction plans of the industry clearly show a most sanguine view is being taken of the future. As of the present

writing, potential capacity of the tin plate mills in the country is 63,000,000 base boxes yearly, a figure which none expects can be reached due to necessary down-time, seasonal influences and not only the impracticability but impossibility of operating all mills, all of the time. But, building plans of the industry now announced find that within the first six months of 1937 the tin plate makers of the country will be geared up to turn out on the basis of 80,000,000 base boxes annually.

Such a wide gain is without precedent. In capacity to make the rapidly-growing call for cold-reduced tin plate alone there is construction under way at the year end for 600,000 net tons, or 12,000,000 base boxes. This compares with an existing capacity to turn out cold-reduced tin plate amounting to 800,000 net tons, or 16,000,000 base boxes annually. The present hot-rolled tin plate capacity of the country is calculated at 2,500,000 net tons, or 50,000,000 base boxes.

The present problem of the tin plate mills is to what extent hot-rolled capacity will be retained. In a large measure cold-reduced mills replace present hot mills, but in other cases cold mills will be built supplementary. There are no instances where hot-rolled tin plate mills are being built, nor contemplated.

Is the industry prepared for real prosperity? In a large sense, prosperity for this class of steel user is already here, as it was in 1935 and 1934. In fact, it is common knowledge that the depths of depression of recent years were not plumbed by the canmakers in the respect that lean times came to many of the so-called "heavy" industries. Rather, a steady call for containers was ever present, but not content with oar-resting, producers merit credit for progressive movements in gaining markets.

Canned beer serves the point well. Bottlemakers thought the idea incredulous, brewers themselves did not ask for it, nor did the public demand it, but alert canmakers saw how a canning business that spent $3,000,000 a year for glass could be converted into one using $90,000,000 worth of cans. And all roughly on the same volume of beer sales.

So, introduced in January, 1935, and with general distribution only since the fall of 1935, beer cans have carved a wide wedge in the glass bottle's market. Well-qualified observers say beer cans used about 4,000,000 base boxes of tin plate in 1936, or 2,000,000,000 cans. This market was, of course, something nonexistent as recently as 23 months ago.

A brief history of the phenomenal growth of cans for beer can be seen from the following: In 1935 the beer brewing industry put up about 46,000,000 barrels. About 70 per cent of this was placed into draft, or wooden kegs; the remaining 30 per cent being packaged. At the beginning of the year all the packaged beer was put into glass, but tin cans began to move into this territory. In 1936 about 53,000,000 barrels of beer were put up for the market; 60 per cent went to wooden kegs, 40 per cent to packages. Of the 40 per cent, glass took 36 per cent and cans the remaining 4 per cent. The 4 per cent item is an increase of 10 per cent over the 1935 share accruing to tin containers.

Three Major Vegetable Packs in 1936

(Unit: 1,000,000 cases)

	1936	1935	1934	1933	1932	1931	1930	1929
Tomatoes	25.0	15.7	13.1	12.0	16.0	9.6	17.0	14.1
Peas	16.2	24.6	15.7	12.9	10.4	13.3	22.0	18.5
Corn	14.5	21.0	11.3	10.2	9.4	19.4	15.7	17.5

Other new products for general line cans are good examples. Orange juice, so opinion said, was never adapted for canning, but container manufacturers began experimenting in 1932 and worked up a market that put up something over 500,000 cases of orange juice in 1936.

Dog food has developed into a lusty outlet for tin containers just within the past few months and another in the same category is canned wine where some of the California packers have turned from glass to tin plate. Canmakers have also unearthed a use in preserving baby food for sale and since introduction in the last few months have accounted for over 100,000 cases. They are working up tin plate also for a use as milk bottle caps. On and on, the potential uses run, the most apparent fact being the alertness with which container makers are grappling with returned prosperity.

One contingency the canmakers are alertly and constantly on their guard against is to prevent a new outlet's demise in infancy through cost factors. The leading reason why tin plate selling prices were not advanced for the 1937 season, as all other finished steel was, arose from the shiftback that would have been inevitable to glass, fiber or paper bags.

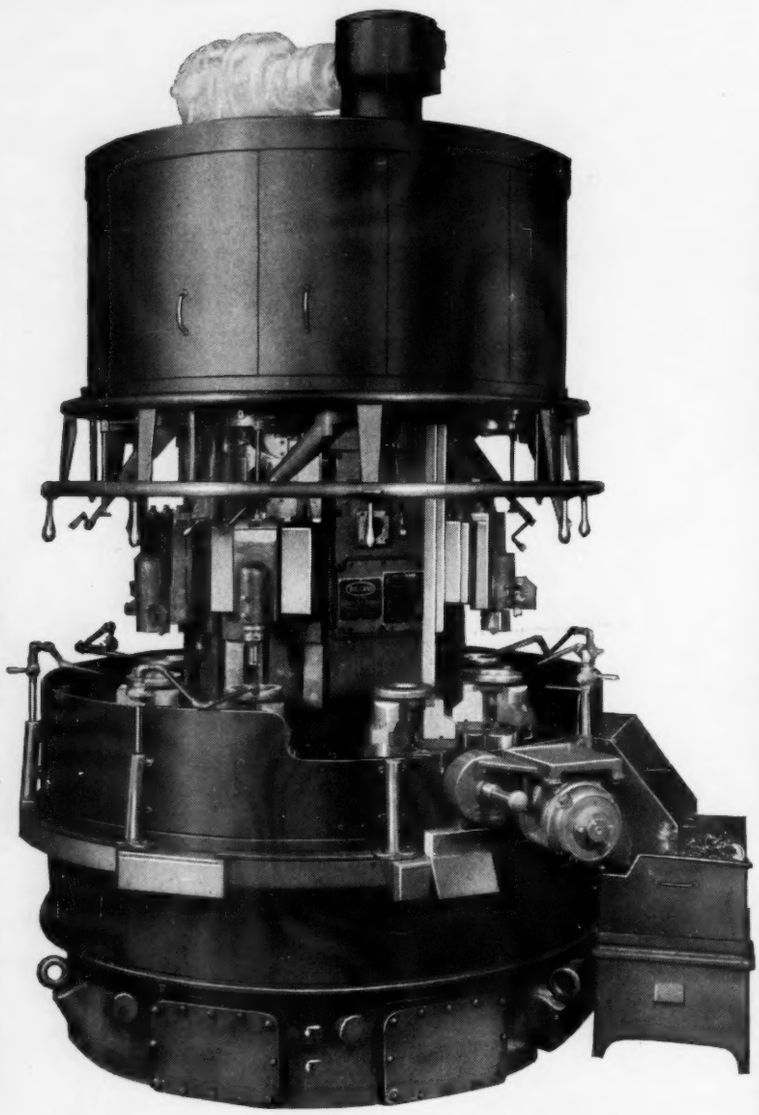
Furthermore, the relatively high lithographing cost on beer cans has meant tin plate costs must be kept down to compete with glass containers. At present, tin cans cost around $24 to $25 a thousand; glass bottles, about $20 per thousand plus $2 per thousand for caps and labels.

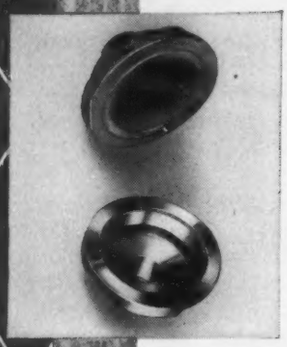
Through merger and acquisition, the canmaking industry has gradually been counting fewer plants, increased wage earners, increased cost of materials and increased value of its products. The 1935 census of manufactures show a slight reversal in the diminishing number of canmakers reported in 1933. The number of plants was 199 in 1931; 232 in 1929; and as high as 377 individual plants in 1904, the first year the census of manufactures recorded figures.

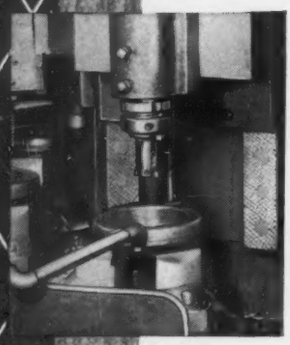
Mutely, these figures show the gradual growth of the two leaders in the field—American and Continental Can Cos.—and in turn testify to the lowered prices of containers, perfection of cans as a unit, and other economies brought about through mass production.

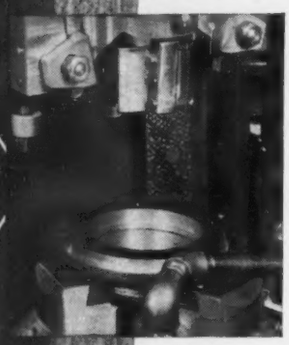
Your 1937 Production...?

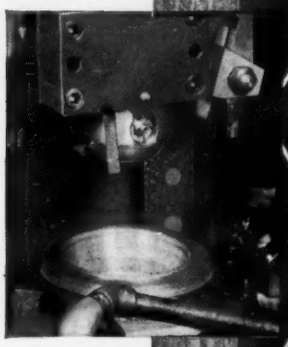
If it's VOLUME you need or if it's added Efficiency and Economy—or maybe if it's these things combined PLUS—then, think of the Mult-Au-Matic Method.

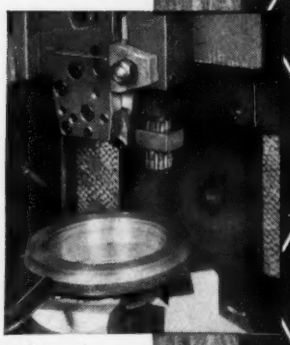


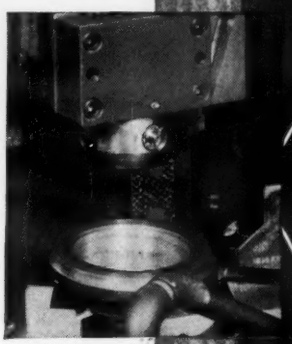


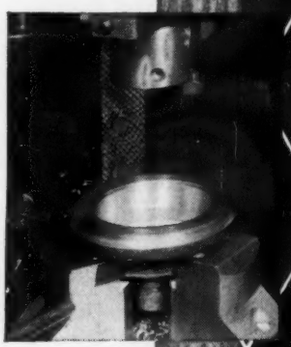












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"D"	12"	6	"J"	7	8
"D"	16"	6	"J"	11	8
"DA"	8"	6 and 8	"FH"	8	Twin-Six
"DA"	12"	6			Two at each Station

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Bridgeport, Connecticut

I BELIEVE the future trend of business in the United State will be upward well into 1937, a continuation of a wave of recovery that started in the summer of 1932. After 1937, the trend will depend on how things are managed. We must balance the budget and we cannot continually increase taxes. We must put our house in order."

Thus Alfred P. Sloan, board chairman of the General Motors Corp., in a late 1936 statement, in a nutshell epitomizes the automobile industry's appraisal of the current position of general business in which it has so vital a stake.

Briefly—and this is reiterated in Detroit through the ranks of other automobile executives—now that 1936 has passed as second best in history, 1937 seems destined a banner year, one which will record 5,000,000 automobile assemblies. But because 1937 bids fair to become the fifth successive year of steady improvement in motor car production, that fact seems to indicate the industry is fast approaching a cyclical peak, and furthermore because of political uncertainties (the nub of which is over the unbalanced federal budget) automotive leaders are wisely injecting a note of caution in their prognosticating.

Consider the cycle through which the industry has been passing. Beginning, it is true, in the middle of 1932, each calendar year since has shown a progressive improvement; in that sense the automobile industry was leading by a period of one to two years the improvement in general business.

Starting from a production total of 1,950,027 cars and trucks in 1933, the first full year after the tide was turned in mid-summer, 1932, the percentage of increase in production for each succeeding year (when related to the year just preceding) was 45, 40, 40, 30 and 25 per cent.

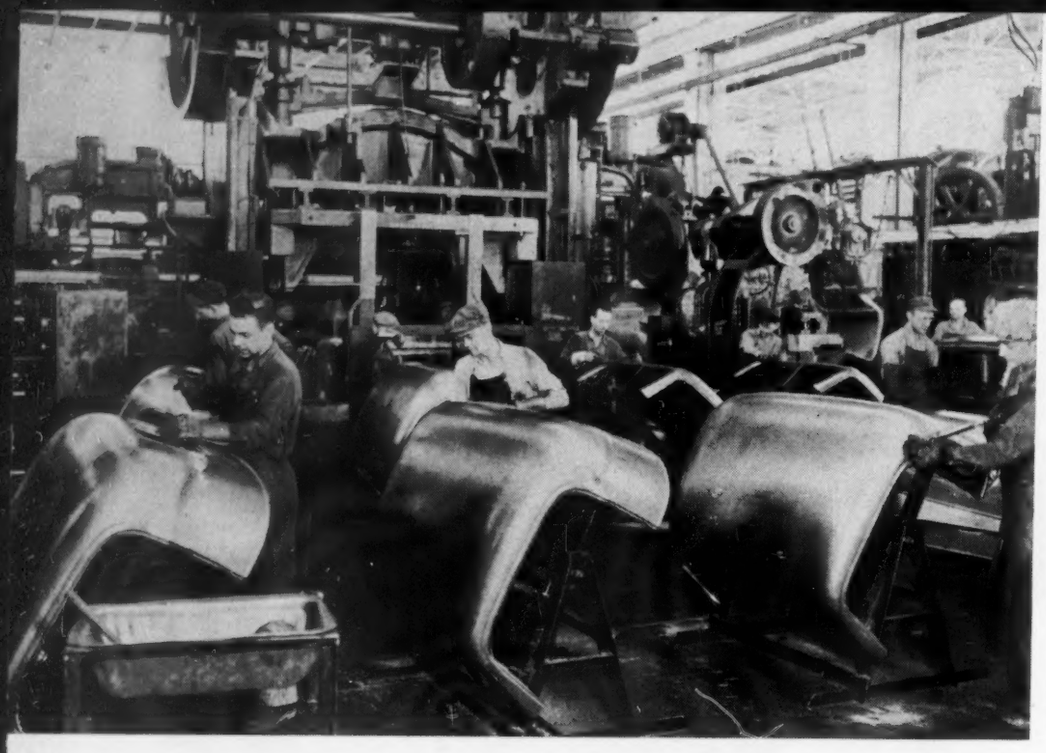
Next year's increase over 1936 will not exceed 15 per cent, at least according to reliable pointers. Observe from the foregoing paragraph, the slower tempo of annual gain year-by-year since 1932, a fact which economists observe is highly significant in plotting long-range forecasts for not only 1937, but into 1938.

For 1937, they can subscribe to a 5,000,000-car year, best since 1929 and second best in history, but in 1938 a leveling-off process after five straight years on the upgrade might be a logical expectancy.

In forecasting a 5,000,000-car year for 1937 models, General Motors has appraised the market for 1937 as good for 5,120,000 models, not including 117,000 units for Canada. These estimates, of course, by General Motors are inclusive figures for all makers:

	United States domestic market	Canada	For export
Passenger cars	3,750,000	95,000	375,000
Trucks	800,000	22,000	195,000

Beyond 1938—and in fact many observers who toil



LARGE presses were kept busy last year turning out automobile stampings such as these steel tops for Chevrolet

at chart plotting will not venture a word for even late 1937 and 1938—the outlook is murky. In the words of Mr. Sloan, "We must put our house in order," meaning in this reference the house of political administration and the myriad other uncertainties, both foreign and domestic.

But to turn back to the year just closed—one in retrospect that surprised even the most hardy guessers by its excess over maximum predictions in December of 1935—from preliminary figures it appears a total of 4,595,019 cars and trucks spewed from assembly lines during the year, second best in the industry's history. This figure obviously includes a reliable estimate for December.

To cite comparison, 1936 went down some 600,000 cars better than 1935; 1,800,000 better than 1934; and at 2,600,000 units above 1933, showed almost 25 per cent increase from the total of but three years ago.

Approximately $2,300,000,000 was paid to car builders for their 1936 output, as compared with about $2,000,000,000 in 1935, around $1,600,000,000 in 1934 and approximately an even billion dollars in 1933.

So phenomenal an acceleration in so short a time takes the fore in modern-day business activity for recuperative powers from the depth of depression. As was forecast, the automobile industry repeated history of 1922, 1924 and 1927 and their minor depressions, by leading the way back to prosperity.

The motor car industry paid steel, the material, a direct tribute in 1936 by using more steel per pound of car weight than ever before in history. True, the total weight of most automobiles made in 1936 was less than in previous years because of design progress in eliminating dead weight, but on the basis of comparing constituent materials, steel's share assumed even greater dominance.

Steel replaced other materials in motor car tops, flooring, door and body bracing, as well as in many formerly nonferrous motor parts to the extent that, from estimates, something between 140 and 150 pounds more steel per car was used in 1936 than in 1935.

As to the outlook for 1937, more devotees of steel for parts where once they used competitive materials may be expected. The near-term outlook should agree that even though designs tend to cut down wheelbases and overall car weight, withal the increasing use of steel per car likely will more than outweigh any loss.

In 1936, something like 3058 pounds of finished steel, on the average, went into each of the 4,595,019 cars produced, as against 2812 pounds in the preceding year and compared with a high since figures were started in 1920, of 4088 pounds per car in 1933. The low over this period of 16 years was 1957 pounds of steel per car in 1923. Here is a summary of the figures:

Year	Car and Truck Production in United States	Automobile Consumption of Finished Steel % of Output	Gross Tons	Pounds Finished Steel per Car
1920	2,227,349	7.50*	2,426,089	2439
1921	1,616,119	9.82	1,450,807	2010
1922	2,544,176	8.98	2,375,390	2091
1923	4,034,012	10.59	3,524,042	1957
1924	3,602,540	11.37	3,193,427	1985
1925	4,265,830	14.60	4,874,496	2559
1926	4,300,934	15.09	5,356,330	2789
1927	3,401,326	13.34	4,386,062	2888
1928	4,358,759	17.76	6,688,934	3437
1929	5,358,420	17.57	7,215,896	3017
1930	3,355,986	14.10	4,161,334	2777
1931	2,389,730	14.78	2,834,197	2576
1932	1,370,678	18.15	1,896,856	3091
1933	1,920,057	20.95	3,505,982	4088
1934	2,753,111	20.87	3,948,830	3203
1935	3,946,934	24.04	5,005,784	2812
1936*	4,595,019*	17.45*	6,400,628*	3058*

*Estimated (See consumption figures on page 334).

Despite the apparent incongruity of more steel per car in 1936 and yet a smaller percentage of all steel used by the motor industry than in the preceding year, the latter was obviously due to the re-ascension to prominence of railroad, building and other heavy construction work in the total of all steel produced.

Is the automobile industry prepared for real prosperity? On only a few scattered fronts is such a question conjured today in the motor car business, for with such amazing success in a short post-depression period, the industry may well afford to consider its gains well consolidated.

Notwithstanding, the industry's critics still find flaws in the pattern, and chief among them are details of the merchandising system. For almost every new car there must be a used car traded in; actually the spiral is deeper for something like 3½ used cars must be turned over in net for every new car sale. This

means that in conditions of 1936, with some 4,500,000 cars made and sold, theoretically some 12,000,000 to 14,000,000 used cars had to be sold, of course, excluding all unsold stocks at year-end. In a rising market, where fresh records are being set month-on-month in new cars, the used car problem tends to, but does not always, take care of itself. This is not meant to infer that at all times used cars are so isolated a question.

During the liquidating stages of a depression, the used car situation is definitely acute. And even in today's prosperous conditions, in many sections of the country the frozen assets of car distributors run into the millions of dollars on automobiles which cannot be turned over.

To this problem, many feel automobile manufacturers have lent a sympathetic ear, but not a sympathetic shoulder. It remained for the depression to show how the used car problem was closely interlocked with the market on new cars, but aside from campaigns on "factory approval" tags for second-hand cars in the field, there has been no serious effort on the part of plants to whip this bugaboo.

Even Ford had to give up buying wrecks for $20 to be thrown into open-hearth furnaces because this practice was unwittingly too much missionary work for competitors. Perhaps the solution will be for every motor maker to have his own open hearths or for each maker to sponsor the compulsory yearly trade-in idea with rental and not outright purchase the sole obligation of the driver.

Engineers Anticipate Drivers' Demands

On engineering developments, the automobile industry can take a back seat to no major industry for all credit in perfecting the automobile's riding, driving and operating ease to the point where the motor car has definitely been lifted from the luxury to the necessity category. Considering mechanical perfection, the automotive industry has shown an advanced concept which transcends current demands to the point where developments are a comfortable period ahead of what the motoring public demands.

In its preparation for real prosperity, the industry through 1936 spent better than $100,000,000 strictly on new plants and equipment. General Motors, as leader, disgorged between $50,000,000 and $60,000,000, and proportionate amounts were earmarked by Chrysler and Ford, with Packard a notable spender for the independent manufacturers.

Growing disposition was in evidence by all makers to spread out manufacturing operations. New assembly and parts plants under way in 1936 on the Pacific coast, in the East and at many points other than Michigan were significant.

Some individual plants built, or building, in 1936 were Chrysler's DeSoto plant; General Motors' new assembly plant at Linden, N. J., and noteworthy expansions at Buick, Olds and Pontiac divisions in Michigan, as well as at Grand Rapids for Fisher Body; Ford Motor's $4,600,000 modernization program which takes in the replacement of obsolescence in virtually every Dearborn department; and Packard's expansion to make a new line of sixes.

In view of the estimated registration of some 1,609,400 new automobiles (in net—that is, new sales' totals over those junked or retired) bringing the total registration of automobiles to an approximate 27,830,000, and assuming a 1,257,000 growth in population for the year, the ratio of people per car came near to setting a new record.

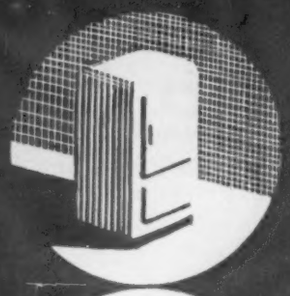
As of the close of 1936, there was one car in use for every 4.62 persons, against a ratio of 4.89 in 1935, 5.07 in 1934 and 5.27 in 1933. The previous record for all times in the industry, set in 1929, of one car for each 4.58 people thus was practically equaled in 1936:

Year	Population, United States	Registration, All Motor Vehicles	Ratio of Population Per Vehicle
1925	115,378,000	19,937,274	5.78
1926	117,136,000	22,001,393	5.32
1927	118,628,000	23,133,243	5.12
1928	120,013,000	24,493,124	4.90
1929	121,500,000	26,501,443	4.58
1930	122,775,000	26,545,281	4.62
1931	124,070,000	25,832,884	4.80
1932	124,822,000	24,115,129	5.17
1933	125,693,000	23,843,591	5.27
1934	126,425,000	24,933,403	5.07
1935	127,172,000	26,221,052	4.89
1936	128,429,000	27,830,488	4.62

Because of a vast number of complexities, "new car' registrations remain as difficult to define as in former years. Until all states treat the definition of what constitutes a new registration with some regularity, only estimates can be taken, but from the most reliable figures available, some 1,609,400 new cars were registered in 1936 over and above the 1935 final, or a 25 per cent increase as against 1935 over 1934.

Flushed with the margin by which 1936 passed forecasts, opinion now agrees that there still is an undermaintenance from the depression which has not yet been cleaned up; that year-end extra dividends and bonuses will find their way largely into new transportation in 1937, that general business recovery and increased individual income will continue into this year —therefore, that this writing marks the threshold of another boom year in the automobile industry.

TOP hats need not be collapsed in the new "unisteel" bodies which Cadillac and other General Motors cars are now featuring. Trend of automotive development is placing more emphasis upon comfort of passengers



APPLIANCES

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MACHINERY

EXPORT . . .

NUMEROUS factors point to increased consumption of steel in the homes of this nation, possibly to an extent never realized before, with the ultimate return of general prosperity. Increased demand may not come in the form of an unprecedented boom; it may not necessarily be apparent in 1937, but whatever the manner of its development every steel product from mechanical refrigerators to bedsprings stands to gain.

It is only partly due to a realization of this that steelmakers have been augmenting capacity for the production of lighter steel products, but nevertheless they will be prepared for a large increase in demand in steel for the household. The automobile industry is the biggest reason. Continuous strip-sheet mills which have been recently completed, or are now under construction or authorized, will raise the annual capacity for broad strip tremendously (see page 109).

In 1929, 927,713 tons, or 2.56 per cent, of the total steel tonnage went into stoves, refrigerators, furniture and other household products. In 1934 it was 497,840 tons, 3.77 per cent of the total, and in 1935 it was 882,326, or 4.24 per cent of the total. Last year the tonnage was well over the 1929 figure.

Sales of most electrical appliances, including washers, ironers, refrigerators, and vacuum cleaners, increased 30 per cent last year over 1935. Rural elec-

trification, abundance of power from such projects as Boulder dam and the TVA, and the general upturn in building are among the factors pointing to the future gain in the production of these products. The middle-class market is still far from the saturation point.

Considering a few of the larger items, manufacturers of electric refrigerators sold approximately 2,300,000 units in 1936, requiring approximately 220,000 tons of steel; gas range and stove makers sold close to 1,250,000 units, requiring 87,500 tons; washing machine sales approximated 1,700,000 units, requiring 130,000 tons.

Reliable estimates have it that the porcelain enameling industry's business for 1936 will show an approximate gain of 35 per cent over the average of the three preceding years, 1933, 1934 and 1935. The increase for 1936 over 1935 is estimated at about 8 per cent, generally accounted for by the increased sales of appliances and other products in which porcelain enamel is used. Only relatively few products were manufactured with this finish until after the World war.

Mechanical coal stoker manufacturers sold close to 100,000 units, a gain of approximately 75 per cent over 1935. Approximately 70 per cent of these machines were of less than 60 pounds of coal feed per hour, the type generally adapted for installation in homes, and the amount of steel used in each of these is between 100 and 150 pounds. Oil burner sales were close to 210,000, compared to 156,700 in 1935.

"The stoker industry will demand increased foundry production in which electric furnace iron and steel will find an increasing usage," says Marc G. Bluth, secretary, Stoker Manufacturers association, Chicago. "The coal hopper will be a bigger consumer of sheets and plates, while the transmission of all the stokers will utilize an increasing amount of alloy steels. Nearly every casting in the modern underfeed stoker requires machining and the design of the stoker lends itself to modern machine tool processing."

IN 1929 manufacturers of air conditioning equipment made aggregate sales of $9,500,000; in 1935 sales of all equipment totaled $47,000,000, and for 1936 it is estimated that the $60,000,000-mark was exceeded. Thus, this comparatively recent industry has been consuming steadily larger amounts of sheet steel in various grades, and pipe and light shapes. It is estimated within the next ten years air conditioning requirements are likely to reach the point where 450,000 tons of steel a year may be needed.

The air conditioning industry has its own problems, including the necessity for reaching lower price levels and the elimination of all unsound marketing practices. Improvement is believed possible, by some engineers, in ducts, pipes, fans and other materials. In 1937 installations are likely to reach a new high point, featured by larger industrial jobs.

"The past year in the air conditioning, heating and ventilating industries has been marked by encouraging signs pointing to an upward swing that gained momentum as the year advanced," says W. A. Danielson, chairman, committee on research, American Society of Heating and Ventilating Engineers. "The year ended with an increase in gross sales for all manufacturers variously estimated at from 40 to 60 per cent. A really big year appears to face these industries in 1937.

"Such problems as corrosion in underground steam lines, the frictional resistance to the flow of air in small ducts and fittings, use of small pipes in forced hot water circulation systems and determination of the proper size of steam pressure reducing valves for different pressure drops, will be among those which engage the attention of our committee for next year.

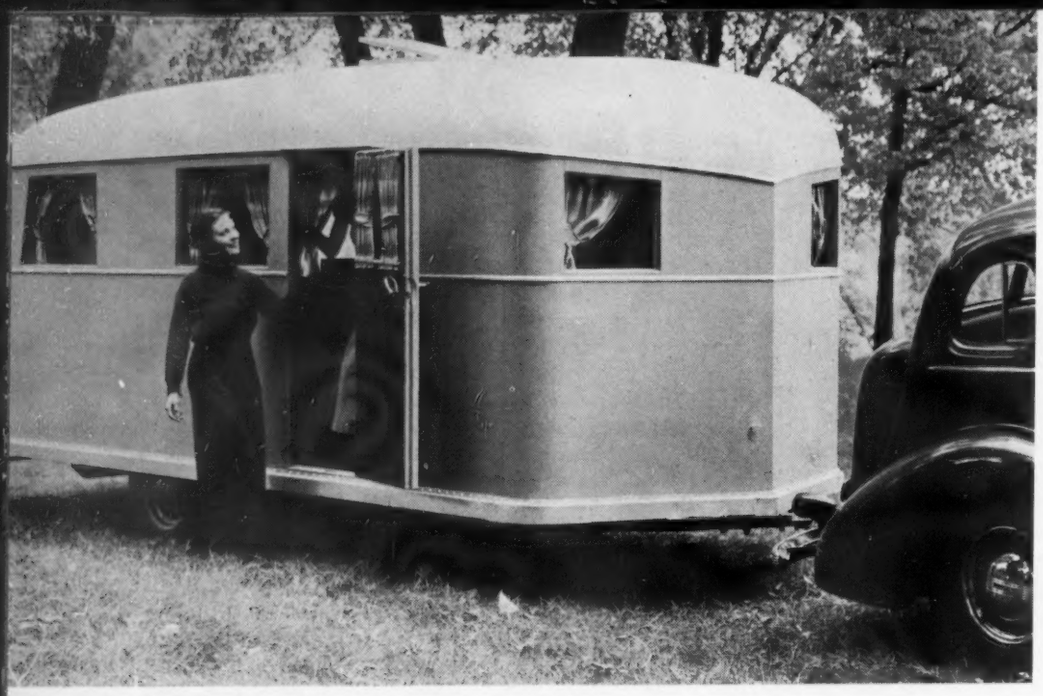
"The steel industry can do much to assist the forward movement in these industries by lending its support to the A. S. H. & V. E. research program on a basis which will enable us to make further constructive studies of the use of steel in air conditioning."

A MUCH younger industry, and only of slight importance to steel producers until last year, but which may consume 50,000 tons of steel in 1937, is the automobile trailer industry. On the basis of preparations which trailer manufacturers have been making, production should approximate 225,000 units in 1937, nearly eight times the number of vehicles turned out in 1936. The industry's capacity has been augmented greatly by the entrance of several automobile and auto body manufacturers into the field. Steel is being used increasingly in trailers, not only in the bodies themselves, but in the furniture and fittings inside the coaches.

Despite the rapid growth of the industry, the manufacturers have found time to take steps toward bringing order in their ranks through organizations. A start toward standardization of coupling devices and other trailer parts was made late in 1936. Problems of safety, including the strengthening of axles, are being given attention. Estimates of the number of trailers now in use vary widely, ranging from 350,000 to more than 700,000.

ALTHOUGH the network of pipelines for carrying oil and gas has been widening steadily over the nation, this form of transportation is still far from its fullest development. At present less than

NEW types of office machines and appliances are contributing to a marked increase in the amount of steel and other metals used in such equipment. Here is a new International autograph time recorder



MOBILE homes such as this Covered Wagon Co. deluxe trailer are meeting with marked favor of the nation's motorists, providing new outlets for steel and steel products

10 per cent, or only about 150,000 barrels, of the total daily output of gasoline is being sent through pipelines.

Production of natural gas centers in only a few states, while only 30 states have refineries. Thus, in both industries transportation problems are important. The natural gas industry has potential markets in the Northwest, New England district and in the Middle West. Gasoline consumption has been expanding steadily. Pipeline construction, therefore, is a market which may be counted upon for steady consumption of steel. In 1929, oil, gas and water lines consumed 9.01 per cent of the total output of steel; in 1935 they consumed 4.29 per cent. Production of all pipe and tubes, including lapweld, electric weld, mechanical tubing, seamless and conduit, increased approximately 60 per cent in 1936 over 1935, bringing the aggregate to 2,900,000 tons. Pipelines accounted for an estimated 1,550,000 tons.

In general, the steel industry has ample capacity to take care of more than two and one-half times last year's output of pipe and tubing, although, as in other steel products, it is possible production might become temporarily unbalanced due to certain lines forging ahead faster than others.

Demand for both seamless and lapweld tubing increased greatly last year. Part of this was due to the resumption of deep drilling by the oil industry. With pumping approaching depths of two miles, the steel in use is being gradually forced much closer to the limits of performance. Operators today feel a greater need than ever before for positive information concerning the dependability of steel to be used in deep drilling.

MOST industries are still underequipped for genuine prosperity from the standpoint of machinery. Even though equipment sales have been accelerating, the inroads made by obsolescence during the depression, plus the increase of 6,000,000 in population since 1929, have created a tremendous potential demand, estimated in excess of $15,000,000,000. In 1929 demand for steel from machinery makers totaled 1,375,571 tons; in 1932 it had dwindled to 315,577 tons, and in 1936 it was again over the 1,000,000-ton mark.

Machine tool sales in 1936, as indicated on the chart (p. 267) were approximately 50 per cent higher than the 1935 rate, according to a late December estimate based upon the index of the National Machine Tool Builders' association. Foreign sales accounted for close to 20 per cent of the total. A 25 per cent increase in the overall average in 1937 would bring the index to the 1929 rate of 155.8, but it is more likely, considering all limitations, that the maximum increase this year will be around 20 per cent.

Builders Cannot Keep Up with Demand

Virtually all classes of domestic users contributed to the uptrend. Foreign orders were substantial for turret lathes, turning machines in general, and other machines. With the shortages of skilled men, increased wages and the trend toward the shorter workweek, it is being realized emphatically that manufacturers must install more advanced machines and make better use of their equipment if they are to keep costs and prices in line with the broadest possible markets for their products. Backlogs of unfilled orders for machine tools at the beginning of this year are extensive; deliveries are far behind.

The largest expenditures for tools and factory equipment came from the automobile industry last year, and were in excess of $100,000,000.

Sales of gears, which have shown a steady advance in design, material and workmanship, and which have been advancing steadily since 1932, were slightly ahead of the 1928 level last year. On the basis of 1928 as 100 per cent, these sales rose to approximately 140 per cent in 1929 and then descended to a low of 32 per cent in 1932.

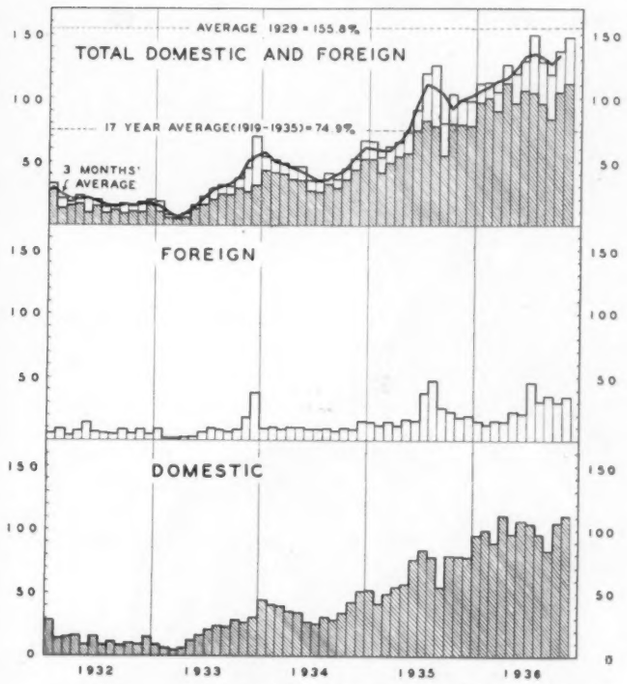
UNITED STATES' exporters of iron and steel products found world markets in general better from the consumption standpoint last year than in 1935, when exports totaled 3,063,605 gross tons. This was a continuation of an upward movement in progress

since 1933, when 1,350,692 gross tons were exported, providing a gain for that year of more than 125 per cent over the 1932 low point of 594,650 tons.

Increased shipments of products other than scrap,

INDEX OF MACHINE TOOL ORDERS
DOMESTIC AND FOREIGN DESTINATIONS

1926 SHIPMENTS = 100%



National Machine Tool Builders Association

including such leaders as tin plate, black sheets, plates and skelp, were largely responsible for the gain shown in 1936. Total exports, including scrap, are estimated at 3,220,000 tons. Ten months' exports of these products, valued at 964,242 gross tons valued at $69,412,339, compared to 774,061 tons valued at $53,005,589 in the corresponding period of 1935. Scrap exports amounted to 1,755,963 tons in the same period, compared to 1,845,437 tons in the equivalent period of 1935. How much of last year's exports in this classification were for purposes of armament in Europe it is impossible to determine.

Industrial machinery exports with an aggregate valuation of approximately $150,000,000 in 1936 were $29,000,000 greater than the $121,000,000 shipments in 1935. At the end of the third quarter of 1936 these exports were $2,618,747 greater than for the entire year 1935. British imports of machine tools from the United States showed a gain of better than 100 per cent over 1935 and the United States increased its share of the total value of Great Britain's machine tool imports from 53 per cent in 1935 to approximately 60 per cent in 1936.

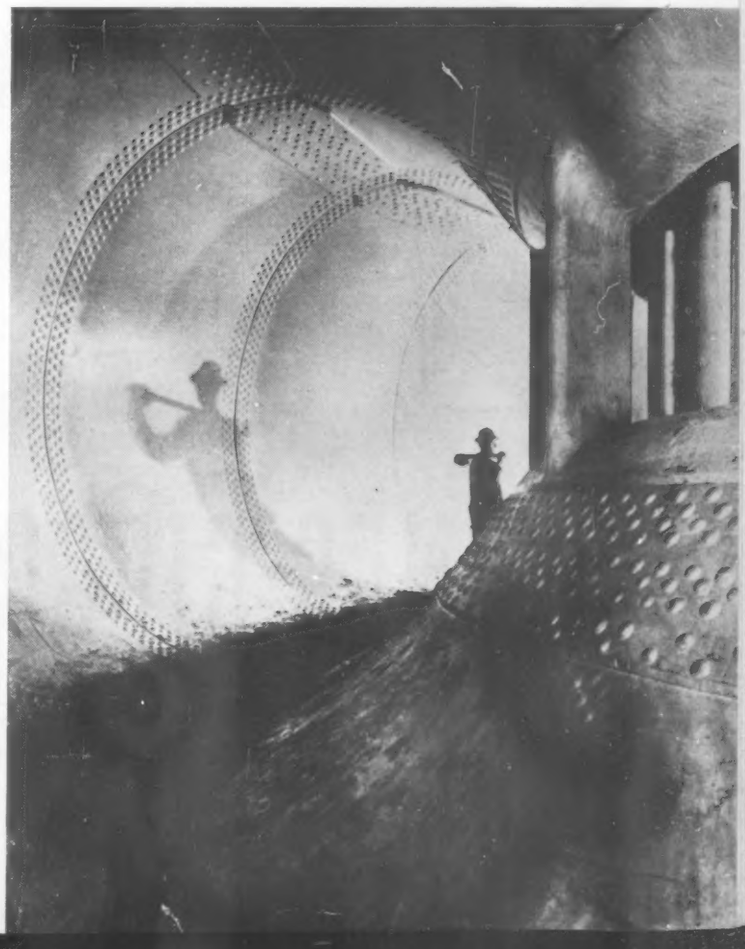
Armament programs were credited in part for the gain in foreign demand, but a large share of the increase was due to improved business conditions. British and German machinery makers will be busy through most of 1937 filling their own domestic orders (see pp. 368, 373).

Aggregate exports of hardware and allied products for the ten months ending Oct. 31 were valued at $28,786,580, an increase of 20.5 per cent over exports in the corresponding period of 1935, which were valued at $23,886,040. If this rate continued until the end of the year total exports were close to $34,000,000.

Hardware sales showed a large increase last year, the wholesale volume being estimated at more than $600,000,000, or an increase of about 55 per cent over the low point for the year 1933. A very satisfactory business is anticipated for at least the first half of this year, according to George A. Fernley, secretary-treasurer, National Wholesale Hardware association. Mr. Fernley reports that some mills already have begun complying with a recommendation of the association that all prime galvanized sheets for distributors stocks be stenciled as "prime."

"Operating expenses of hardware wholesalers reached an all-time high in 1932," says Mr. Fernley. "But because of increased volume and efficient management, overhead expenses have been brought in line with the more prosperous years of 1928 and 1929, resulting in satisfactory net profits. Our members realize the possibility of shrinking margins during 1937 because of higher wages and increased taxes, and the possibility of increased volume in 1937 not being as great as the increase this year over 1935. In many hardware lines it is difficult to secure prompt shipments and manufacturers require from four to six weeks in which to fill orders. Wholesalers, in general, feel there is no incentive to sell goods at unnecessarily low prices, which not only demoralize market conditions, but establish low margins which seriously affect net profits."

CLEVERLY placed camera and lights produced this striking impression of the interior of a large penstock at the Norris dam, Tenn., hydroelectric project



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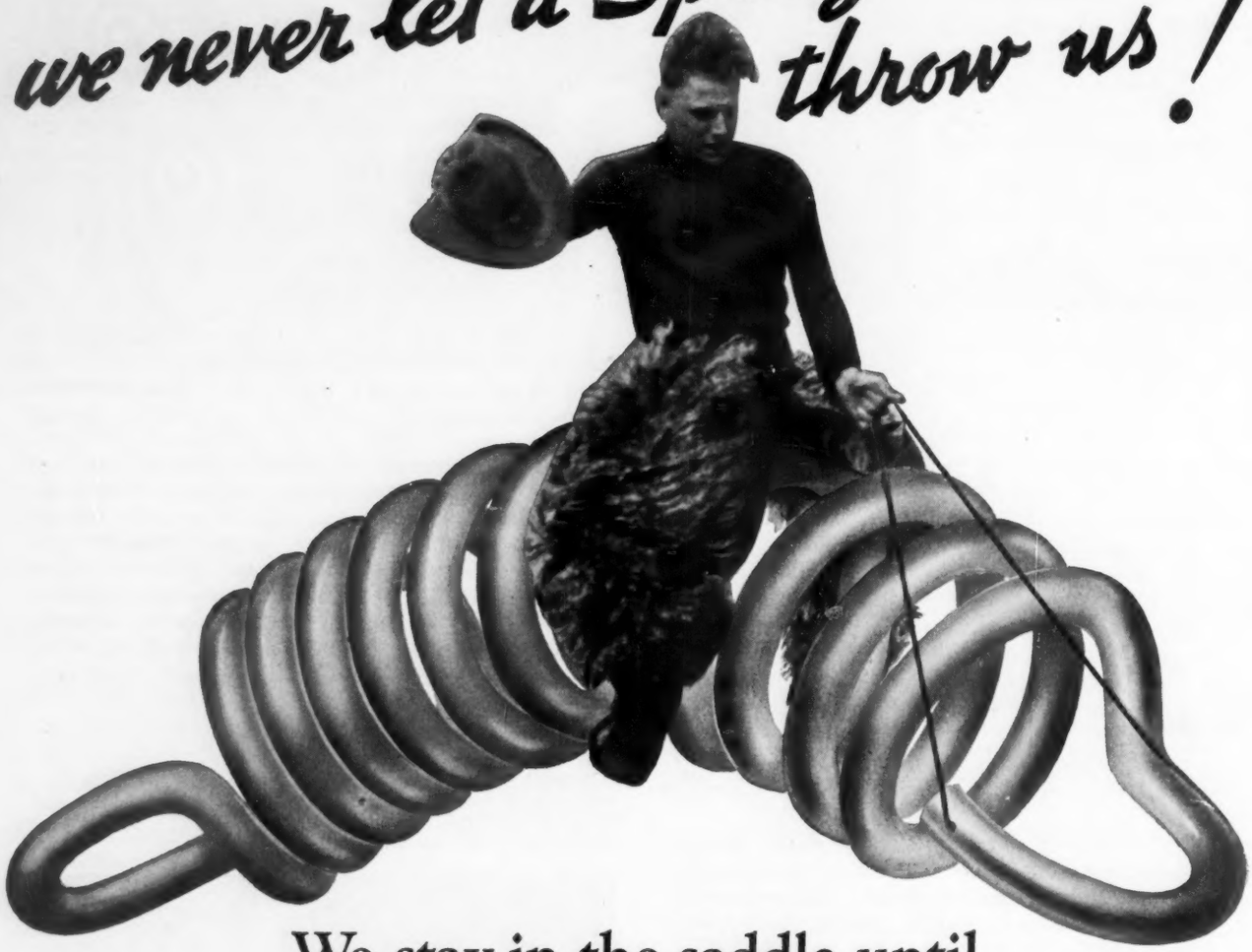

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Questions Plenty as Industry Enters Upon Fifth Year of New Deal

HOLDING in one hand the key which formally opened the new San Francisco-Oakland bay bridge, the President perhaps holds in his other hand the key to administrative affairs of vital concern to industry. Wide World photo

WASHINGTON

ONLY a crystal-gazer could foretell what will be done to or for industry at the national capitol during 1937. This applies equally to congressional and administrative actions.

About the time this is being read the seventy-fifth congress will be convening in what is expected to be one of the most momentous sessions ever held insofar as industry is concerned—with the exception of the wartime congress.

Any number of matters now pend in Washington, all of vital concern to industry, and during the congress many more will come up demanding attention if its interests are going to be properly guarded.

To name a few of the things in store for the coming year: Still pending in the department of justice is the so-called collusive steel bidding investigation asked for by the President. Doubtless that will be disposed of during 1937.

Rumors have been thick in connection with this investigation—as of course they always are in a case of this kind. One of the most persistent is to the effect that so far the department has really not found enough evidence to start any prosecution as suggested by the federal trade commission in its report to the President. The story goes that as a result of the lack of actual evidence which would hold water in a court of law the department is now engaged in rechecking some of its information.

This affair may be soft pedaled shortly because there are insistent reports that both the attorney general and the assistant attorney general, John Dickinson, in charge of antitrust prosecution, may resign soon. That, of course, would hold up this case as Mr. Dickinson has taken a close personal interest in the investigation, having frequently conferred with the attorney general on it.

REGARDING legislation, one of the bills nearest the heart of the steel industry is the Wheeler basing point bill. It will be reintroduced at this session. Remember this is an entirely new congress—hearings held at the last session are not in order. In other words, the weeks of hearings held on the Wheeler bill at the last session will go for nothing and steel executives must look forward to going through all that again—unless Senator Wheeler should have a bright idea and accept the hearings of the last session—with possibly some amplifications. Considerably more evidence now indicates that such a bill will be pushed.

From the congressional end of Washington also, industry must recall the possibilities of tax legislation. Just what form that will take cannot be learned at this particular time.

Excise taxes expire June 30. This means these taxes either will have to be re-enacted into law or some substitutions made. It is reported some of these taxes cost more to collect than the government receives and there is every reason to believe this situation will be taken into consideration.

The President, the secretary of the treasury and Senator Pat Harrison, chairman of the powerful senate finance committee, all have declared recently there will be no need for any additional taxes at this time. This is a hopeful sign, especially since there is talk that something will be done to iron out some of the inequalities of the corporate surplus tax law. Everyone admits this act was hastily and probably improperly drawn and indications are that its sponsors will relent and perhaps do something to ease the burden—especially for some corporations which have been hard hit by the present act.

Congress will also have brought to its attention the two laws which have caused so much comment during recent months, the Robinson-Patman act and the Walsh-Healey government contract law. Two very definite schools of thought are discernible in connection with amendments to these acts at this congress. One, including Patman himself and Miss Perkins who enforces the contract act, believes that these laws should be amended now and the other believes no amendments should be made to either of the laws until after the government has had sufficient time to find out about their administration, to find out how the acts work, and to get some final

judicial adjudication. That, they say, is the common-sense way to look at the two laws.

ANOTHER bill which did not receive much attention during the last session but which the A. F. of L, is backing and which is bound to be discussed at length is the O'Mahoney industrial licensing bill. This bill will be reintroduced and it is reported the President is having it surveyed by some of his legislative friends. In addition Senator Wheeler, of Montana, chairman of the senate committee on interstate commerce, in charge of this type of legislation, obtained prints of the bill some time ago with the idea of making a study of it before congress convenes this month.

The O'Mahoney bill, not taken seriously by industry at the last session of congress, is most drastic—said to be one of the most emphatic bills introduced during the New Deal administration.

It is divided into three parts. The first provides that no form of enterprise can engage in interstate commerce without a license issued by the federal trade commission. This would apply alike to corporations, partnerships, or individuals. One of the conditions of this license would be noninterference with collective bargaining, no child labor and no discrimination against women in industry. In the second section of the bill protection is afforded creditors and stockholders by a set of rigid conditions—also most complicated. The third section of the bill permits but does not require the establishment of federal corporations, and provides certain advantages through federal incorporation.

Provision is also made for conferences with the federal trade commission by basic industries together with labor to work out a plan of stablization. The bill does not prescribe hours of work or wages as has been stated in some quarters. However, provision is made for a study of hours and wages by the trade commission with a report to congress.

There is a blast at company unions in the bill by the provision that employers shall not contribute any financial or other assistance to a labor organization. Little is contained in the bill about fair trade practices. No new standards are set up but provision is made by which the trade commission may order licensees to abandon any trade practices which have been declared illegal by the courts.

IN a politically managed economy such as the New Deal has sponsored, industry's spokesmen in Washington will be heard with increasing regularity. Here is E. T. Weir, chairman of National Steel Corp., as he appeared at a recent meeting of the Senate labor committee. Wide World photo

CLOSELY allied to the O'Mahoney bill will be a general discussion of the revival of the NRA in some form. Of course the administration has shown all along that it is favorable to this but whether or not it will really go to bat and ask for such legislation is anyone's guess at this time. However, with the many new faces and voices at the capitol, talk will be rife on this subject. Also, labor organizations will do all they can to promulgate some kind of an NRA echo.

In addition to the legislation mentioned, there are unending labor bills which will come up, including the 30-hour week bill, which barely escaped passage at the last session due to the hard work of some of the representatives of industry stationed at and near the nation's capitol.

Another question of vital interest is just how far the administration is going to ride along with labor. How far will congress ride? Or will it get out and walk back home? Also what will be the ultimate outcome of the imbroglio between John L. Lewis and William Green from the standpoint of the Washington situation?

The President has not been back in Washington long enough after his South American trip to ascertain his attitude toward labor. In fact the country has not ascertained it in four years. But he is on the spot due to the help labor claims to have accorded him during the last election. On the other hand it is pointed out by his admirers and advisers that he is not beholden solely to labor for the election results. He can well point to his large majority which, of course, would not have come from labor alone. To that extent he is free from the labor tag.

To foretell what industry can expect from the department of labor this coming year would be a difficult guess at best. It is well known that Miss Perkins has never been favorable to the steel industry, partly due to an unfortunate misunderstanding which took place in the early days of her membership in the cabinet.

Of course the labor department administers the Walsh-Healey law and this in itself does not create a "palsy-walsy" feeling in the minds of steel executives. Add to this the fact that Miss Perkins believes this law should be made more severe than at present and that rumor says her department will suggest amendments to it at this session.

INDUSTRY at least can look forward to co-operation from the department of commerce for the coming year. No matter what one may think of Secretary Roper he is always apparently trying to do something for business. Whether he succeeds or not is

(*Please turn to Page* 411)

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HEAT TREATING

METALLURGISTS and other authorities concerned with the heat treatment of metals appear to be in mutual agreement that the most interesting and significant development of the year was the system for differential hardening by electric induction — or the Tocco process as is more familiarly known. This method, sponsored by the Ohio Crankshaft Co., Cleveland, was applied originally to the bearing surfaces of automobile engine crankshafts, and present indications are that many automobile builders are planning to make installations.

By the method, a current is induced in the surface of the metal to heat the desired areas. After subjecting these areas to a well controlled, high-frequency current for the correct length of time, the electrical circuit is opened and simultaneously the heated steel is quenched by a spray from a water jacket built into the inductor block. A hardened surface can be obtained without impairing the ductility of the shaft, and with a minimum of distortion.

While the method is ideal for production runs on such parts as automotive engine shafts, both crank and cam, as pointed out by Dr. O. E. Harder, assistant director Battelle Memorial institute, Columbus, O., there are certain disadvantages such as cost of equipment installation, some special equipment for each different part or surface treated and the possible limitation of the process to a relatively small number of types of parts.

Dr. Harder also observes that the progress of the radiant tube furnace for annealing made good headway during 1936. This process gives more rapid heating of the work and at the same time avoids contact with objectionable atmospheres; however, advancement of this new type of furnace may be limited somewhat by the ability of the radiant tubes to give satisfactory life at some of the higher temperatures. Use of this type of furnace in ceramic applications and in annealing malleable iron represents another important advance, in the opinion of R. J. Cowan, metallurgical engineer, Surface

Combustion Corp., Toledo, O. Scanning other aspects of progress in heat treating, Dr. Harder notes that much research work has been done on controlled atmospheres for bright annealing, and special atmospheres have been introduced. Since there is no universally satisfactory atmosphere (commercially available) for all types of work, continued research is evidently necessary to develop the best and most economical atmosphere for different types of work.

While work on the control of grain sizes and hardenability of steel has continued to make further progress, he points out that there are numerous features of grain size control, predetermination of grain size characteristics, normality versus abnormality, and hardenability, which are not thoroughly understood, and continued research is indicated.

Dr. Harder further observes that "the introduction of such heat-resisting alloys as Smith No. 10 and Kanthal has made possible the operation of electric furnaces with metallic heating elements at higher temperatures than formerly. Apparently, marked improvements have been made in other metallic resistor heating elements, such as the 80 per cent nickel—20 per cent chromium alloys, and manufacturers are now willing to guarantee such heating elements for relatively long periods of time and at higher temperatures.

"The effect of repeated tempering on the performance of high-speed steel has been more clearly recognized this year than ever before. In some cases, after hardening, high-speed steels are reheated two or three times at the usual tempering temperatures and markedly increased life is reported; the increase being two or three times the life of the material which received only a single tempering treatment. Some investigators consider reheating in a cyanide bath particularly helpful."

POINTING out that the Packard Super-Eight and Super-Twelve cars introduced in September both use induction-hardened crankshafts, W. H. Graves, chief metallurgist, Packard Motor Car Co., Detroit, believes this to be the first use made by the automobile industry of this interesting hardening method.

He finds the problems of greatest concern in the heat treating of metals to be distortion and scale, from the quality product standpoint. The life of muffles and proper operating conditions in gas carburizing are major problems from an operating standpoint.

W. B. Coleman, president, W. B. Coleman & Co., Philadelphia, views the induction hardening process as a "notable achievement in the direct application of current to produce heat with minimum losses and with considerable saving in time." He feels that the general principle will be applied further to heat treating work.

Heat treatment of gray iron is coming in for more attention, according to Mr. Coleman, and at the same time better control is being obtained in the nitriding of cast iron. He foresees some interesting applications of the latter material in the near future.

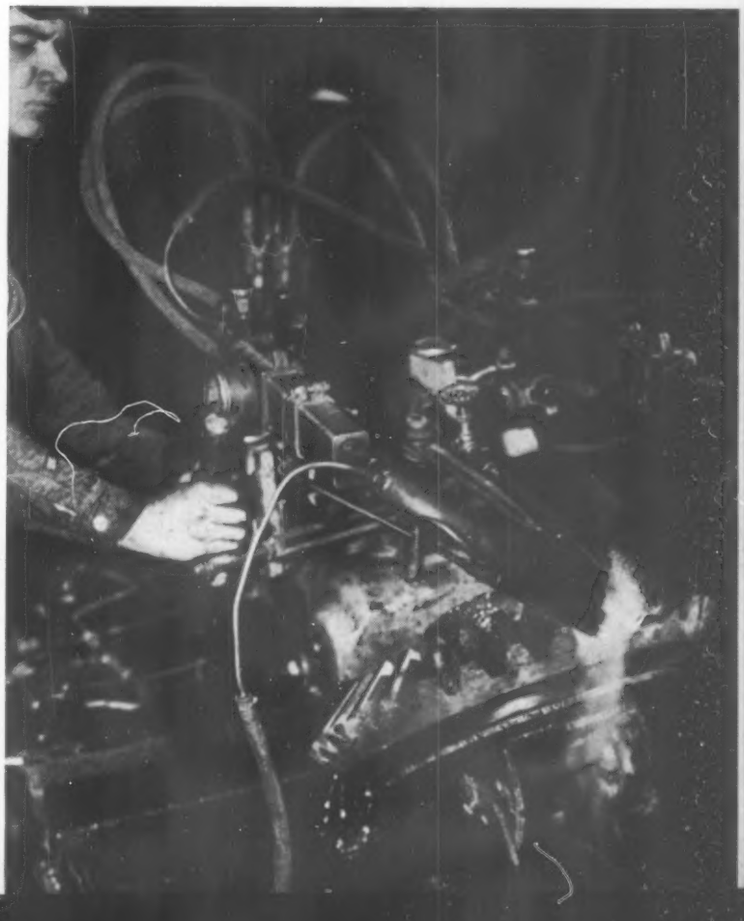
Flexibility of the induction hardening method impresses W. P. Wood, professor of metallurgical engineering, University of Michigan, Ann Arbor, Mich., who believes that possible applications of this method are unusually extensive.

"Outstanding development in heat treating in the past year or perhaps 15 years," is how Gordon T. Williams, metallurgist, Cleveland Tractor Co., Cleveland, regards the new Tocco process. He sees its rapid hardening of surfaces, coupled with low distortion, promising to solve many production problems. Regarding controlled atmospheres, Mr. Williams expresses the hope that their growing use will bring a better insight into the basic principles behind atmosphere formation, applications and effects. He further notes that inductively heated liquid baths bid fair to be of major importance in future progress in heat treating.

REGARDING the latter development, E. F. Davis, metallurgist, Warner Gear Co., Muncie, Ind., reports that nearly a dozen installations have been made in various parts of the country during the past year. The principle involves a furnace heated by electrodes within a pot surrounded by insulating material. Thermal efficiency is high and objectionable features have hitherto not been discovered. Quick recovery of temperature when cold work is immersed, greater comfort for operators, close temperature control, and greater pot life are the principal advantageous features.

Mr. Davis further observes that a number of different types of activated baths are being used throughout the heat treating industry. All are based upon the cyanogen reaction with steel and all utilize cyanide in the salts employed. The cases produced contain varying amounts of nitrogen in addition to the nor-

HARDENING steel by the oxyacetylene flame is not a new method, but last year was accorded more attention as a flexible and economical hardening process for certain types of work



CLOSEUP showing crankshaft in position in inductor blocks of electric hardening unit, so arranged to quench the heated steel an instant after it reaches the proper temperature

mal carbides formed on the surface by the carburizing salts used.

Gear hardening in a carburizing atmosphere is gaining some popularity, although it is being used by only a few of the larger companies where production justifies the expense of continuous furnaces. Tests have indicated that gears so hardened are satisfactory in service.

"Quality of steel for heat treating," concludes Mr. Davis, "has shown some improvement during 1936. The silicate inclusion problem appears to be under better control with less of this trouble than formerly. Some of this trouble has been attributed to the use of fireclay hot tops in ingots. Steels with abrasive inclusions have been particularly troublesome in the gear industry, due to the destruction of costly gear cutters when the latter contact these hard silicates."

FLAME hardening, or localized hardening by the oxyacetylene torch, has come in for greater attention during the past year. This development, while not new, has been perfected to a much better degree and is being more extensively adapted to production needs. H. S. Rawdon, chief, division of metallurgy, department of commerce, Washington, points out that "in the past the skill of the individual worker played so important a role that the method was somewhat crude and was severely limited in its commercial applicability. The development of the combination gas torch and water spray, permitting as it does such a nicety in control, has practically eliminated the human factor save for the need for an operator to guide the flame. The method appears to have wonderful possibilities." Two recent articles in STEEL were devoted to analyzing some of the technical aspects and possible applications of flame hardening.

"We are still in a period of intense research in metallurgy," says R. L. Dowdell, professor of metallography, University of Minnesota, Minneapolis, "Alloy steels of every conceivable composition, heat treatment and properties are known and are ready for use, and methods of fabrication have kept pace with compositions. During the past year the new and improved continuous strip mills and direct rolling have been making phenomenal strides.

"As a result, unprecedented applications are astounding the world—high-speed trains, airplanes, new furniture, metal houses, trailers, improved automobiles, air conditioning, modern kitchens and kitchenware, and even streamlined toys. With the production of wide sheets which can be fabricated into almost any shape and later given a great variety of attractive finishes, unlimited possibilities have opened up before the metalworker."

A YEAR of mixed developments, is the impression of 1936 gained by A. M. Steever, superintendent, Columbia Tool Steel Co., Chicago Heights, Ill., who feels that one of the most important trends of the year has been the change to accurate temperature control and atmosphere control in the mill furnaces used for producing steels which depend upon subsequent heat treatment for their ultimate properties. This change, while less in evidence than the users' prior change in the same direction, logically followed the former, Mr. Steever points out.

Continuing, he states: "With the better final heat treatments, variations in manufacture, resulting from mill variations of the same sort, became increasingly apparent. This trend has been the most important one during the past year still appears to be an item of major concern, representing first a requirement for new equipment which is capable of producing controlled results and, secondly, the need for manipulation experience in the use of temperature and atmosphere control with the improvement of product."

Progress in the heat treatment of deep-drawing steel, particularly autobody stock, was worthy of note in 1936, according to Howard Scott, metallurgical division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., who notes that the latest requirement is that this material be heat treated continuously under a protective atmosphere, allowing not more than 9 minutes for the complete temperature cycle. Research developed a cycle which yields satisfactory deep-drawing qualities in that time despite somewhat higher hardness than is obtained with batch annealing. The laboratory cycle, Mr. Scott points out, has been applied successfully in the field this year.

USE of insulating brick has increased considerably in heat treating furnaces, according to C. E. Bales, vice president, Ironton Fire Brick Co., Ironton, O., who states further that high-temperature insulating brick made from cyanite is now in process of development. Mr. Bales adds that operating temperatures in many furnaces have been increased, and several firebrick manufacturers are now offering specially fired super-duty fireclay brick for such use.

FOR production of atmosphere gases for controlled-atmosphere furnaces, General Electric Co., Schenectady, N. Y., developed in 1936 a 15,000-cubic foot output atmosphere-controller, comprising flowmeters

(*Please turn to Page* 426)

KEYNOTING the machine tool industry in 1936 has been the sudden recovery from lethargy of a vast buying power, ready to do business in a hurry and with the first comers. To meet this sudden demand, manufacturers of all types have turned to the machine tool builder with demands for faster machines and more of them immediately.

Aside from the accent on speed, most important of all trends has been the development in design. Influence of machine appearance has become more important in recent months to manufacturers both from the standpoint of plant efficiency and of influence on workers. Emphasis on design has been responsible also for increases in speed of production as a result of such refinements as grouping of controls in a central location, improving appearance and saving lost motions.

This changing outlook and greatly increased pace in the industry has brought with it many maladjustments; has shown up the weak points and the bottlenecks; has indicated the deplorable lack of advancement within the industry during the era just closed; and has loosed a flood of modernization plans in manufacturing plants large and small throughout the country, taxing the outmoded facilities of many tool builders. What do the leaders of the industry see as important factors in the development now current in the industry? This question is in order for any analysis of the preparedness of machine tool builders in the swing back to the top of the business cycle.

Foreseeing a new era for tool builders in which highly developed labor saving devices will be in greater demand than at any time in the past. N. D. MacLeod, president, Abrasive Machine Tool Co., East Providence, R. I., and past president of the National Machine Tool Builders' association, says "If one considers the results of the recent national elections, it is obvious that a majority of the citizens like the idea of centralized government control and security. If this process is carried to its final conclusion or even part way, there is no question that people will be taken out of productive positions. Those remaining to do the manual or production work will be forced to produce more and more to satisfy the demand of the whole people. It will be impossible under the present social conditions to increase the hours of labor materially. The solution, therefore, will be to put better and better tools in the hands of these workers. Modern tools and equipment will be absolutely necessary in order for a plant to remain in a competitive position. The old equipment must go.

"The stumbling block on the way to further prog-

ress, more goods and lower prices on these goods is the tremendous quantity of obsolete machine tools and equipment now in use. Modernization along these lines has only just begun."

Rapid development of broaches has been an outstanding feature of the industry for 1936, with several complete lines of broaching equipment for all purposes being placed on the market. Aside from the use of such machines for smaller forgings or such work pieces, this method was applied for the finishing of large surfaces on cylinder blocks and similar work, resulting not only in considerable increase in production but also in improving surface finish and accuracy of such parts. Progress was also made in broaching internal surfaces and curved surfaces both external and internal. Spiral broaches for internal cylindrical surfaces were among the year's contributions to this field.

Electric Drives Show Advances

Machinery electrification is developing rapidly and adding to the speed and flexibility of machine tools, states R. S. Elberty, machinery electrification, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. "The application of electric drives," says Mr. Elberty, "has developed rapidly and has contributed greatly to the recent improvements made in machine tools. Importance and value of a suitable electric drive was demonstrated when engineers representing leading machine tool builders attended the first machine tool electrification forum, held at the Westinghouse East Pittsburgh works in June.

"Motorizing individual machine motions of large machine tools has enabled the control of these machines to be concentrated in a small control station which may be portable or located on the machine convenient to the operator. This advantage reduces machinery costs by cutting the time required for set-up operations to a minimum. A notable improvement in electric drive has been made by the addition of a regulator to the conventional variable voltage drive. This regulator holds the motor speed constant at any setting regardless of load variation and permits the use of wider speed ranges with this type of control.

"Electrical drive is finding its place on machine tools of the automotive type, the main advantage to the user again being the flexibility of the machine and the reduction in set-up time. In this same connection, electrical control of hydraulic mechanisms has also been applied over a wide variety of tools.

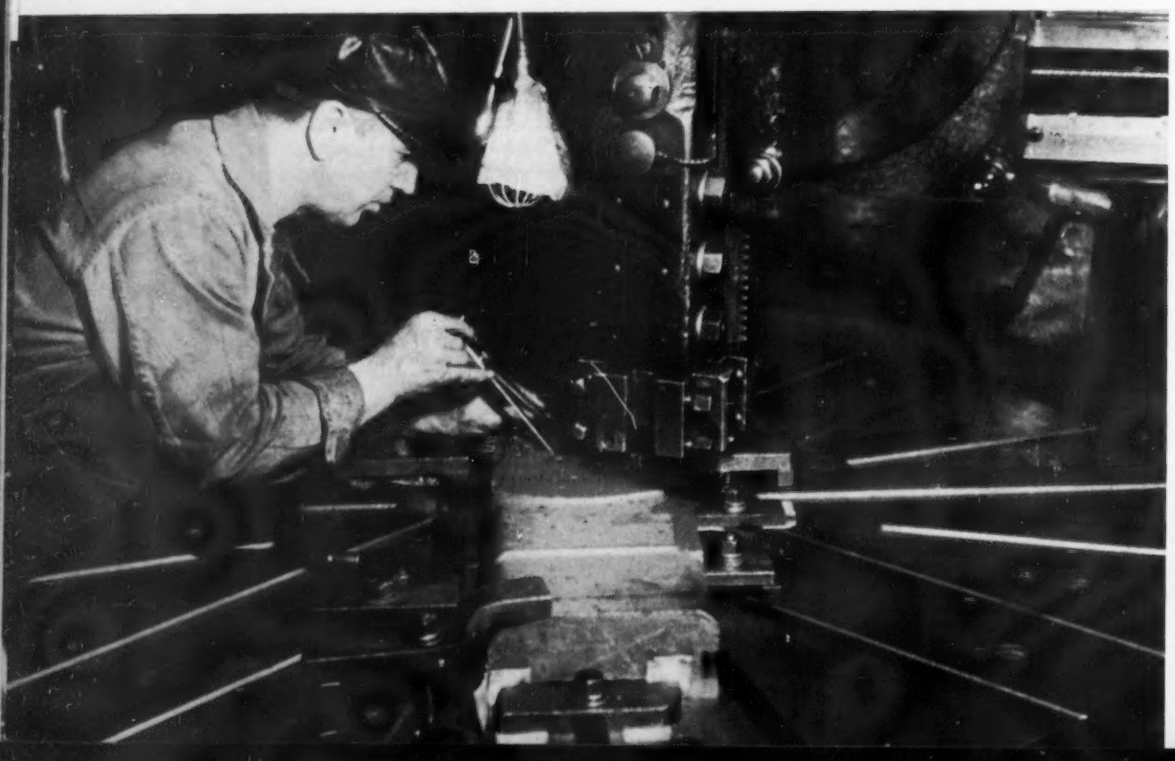
"Dynamic balance of rotating machine parts is receiving more attention in the machine tool industry because of the need for greater speeds and accuracy. Dynamic balancing of spindles has been used on grinders for some time, but it is now being used on drills, lathes and boring machines.

George T. Trundle Jr., president, Trundle Engineering Co., Cleveland, believes manufacturers are considering more carefully than ever before their purchases of new equipment. According to Mr. Trundle, "the manufacturer is insisting on more facts on which to base his decision. As an illustration, he wants to know if the machine will produce a better product as well as lower costs. He is watching the consumer's wants and he is doing research work in an endeavor to produce a better product, pay higher wages to labor and sell to the consumer at prices that are not too high.

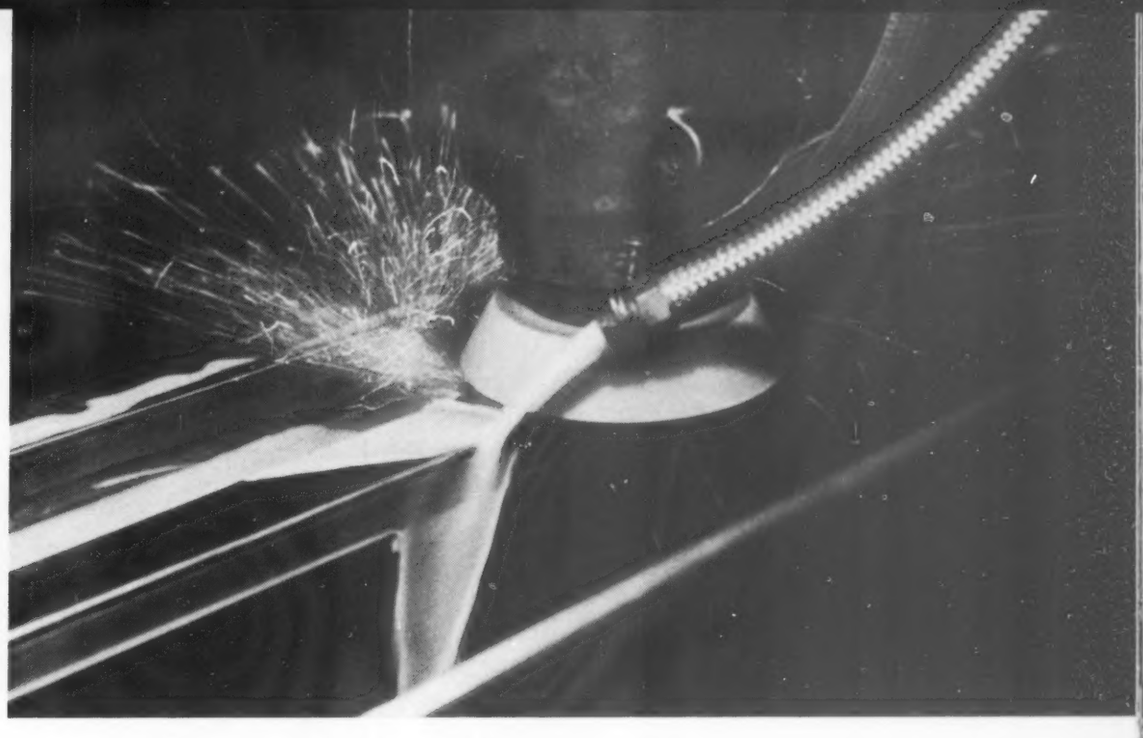
"In my opinion business as a whole realizes for the first time the necessity of keeping wages high and prices to the consumer as low as possible. This has been accomplished through better management and the utilization of the many new developments in welding, cutting alloys, electric controls, hydraulic feeds, mechanical conveyors, proper selection of lubrication, cutting compounds and coolants, modern machine tools and complete utilization of the many developments in new materials.

"Where the purchase of new equipment is found necessary, it is more important than ever that such equipment be adaptable to changes that are inevitable. The single purpose machine, unless immediate uses justify its purchase, may turn out to be an investment of doubtful value."

Increasing speed of machine tools has imposed an



ONLY by adopting precision manufacturing methods, can machine builders provide tools which will accomplish precision work



INDUSTRY has shown no letup in the demand for better machine tools to do a better job at lower cost. Vast quantities of obsolete machines still await replacement

extra load on the bearings, in the opinion of J. H. Baninger, assistant chief engineer, New Departure Mfg. Co., Bristol, Conn. Ball bearings have come into wider use as a result, and developments such as the flange-type precision bearings for spindle mounting, which permit a straight through bore in the headstock, assuring perfect alignment for the front and rear bearings have appeared.

Totally sealed bearings have been adopted generally in machine tools because of the absence of maintenance and ease of installation, reducing the manufacturing cost. Both single and double row types are popular.

Accuracy as well as large volume production has been the demand, according to C. W. Kirkpatrick, secretary, Landis Machine Co., Waynesboro, Pa. Says Mr. Kirkpatrick, "For a number of years higher standards of accuracy have been demanded by manufacturers of automobiles, aircraft and their component parts. Machine tool builders have designed their products to meet these demands. The insistence for further increased accuracy has not abated and every manufacturer of machine tools is confronted with the necessity of producing equipment that will meet the increasing requirements for greater accuracy.

"We have found that during the past year the demand for greater accuracy has applied to products which ordinarily are not looked upon as requiring a high degree of accuracy. In manufacturing thread cutting equipment it has been necessary to produce more accurate threads, requiring new designs in threading machines.

"We have been compelled to further the design of hydraulically operated thread cutting machinery. We have also been compelled to design three and four-spindle semiautomatic threading machines which must not only meet the requirements of higher accuracy but also increase production and thus reduce threading costs per unit.

"We firmly believe that greater effort is required on the part of the machine tool builder to meet further demands for increased accuracy and for higher production. We also think machine tools must be designed to reduce to a minimum the efforts of the operator. The machine tools designed several years back will not suffice for today's production needs.

"Industry in general, we believe, realizes the necessity of modernizing plants and equipment. The manufacturer who believes he can meet competition with equipment ten years old is going to pass out of the picture faster than is anticipated. Competition is to be met only by installation of machine tools designed wholly or in part for the particular branch of industry where they are to be installed."

Points from the Consumer Angle

Problems for the industry to overcome in the future are outlined by a large user of machine tools, the Cadillac Motor Car Co., Detroit. F. T. Ellis, superintendent of manufacturing for that company, cites some of the major shortcomings of the industry from the standpoint of a consumer rather than a producer of these machines.

"There is undoubtedly a decided trend toward complex special equipment with the idea of eliminating labor costs," he says. "Special machines are productive when they are working but our experience has been that they are subject to weakness which mean breakdowns and tie-ups in production. Diligent effort on the part of the tool builders should be expended to overcome this state.

"There has also been a decided trend to welded construction. Added advantage to the builder results in eliminating patterns and decreases in cost of construction plus earlier delivery date. It has been our experience that cast iron in many cases results in a more solid foundation for the machine tool base.

"Hydraulic controls are now being used extensively and in most cases are satisfactory. They give flexible and smooth feeds and seem to be easier on cutting tools than mechanical feeds are. The difficulties with them seem to be connected with the sort of oil used and some trouble with the pumps. There seems to be no oil yet developed which does not have variations in viscosity and consequently there are changes

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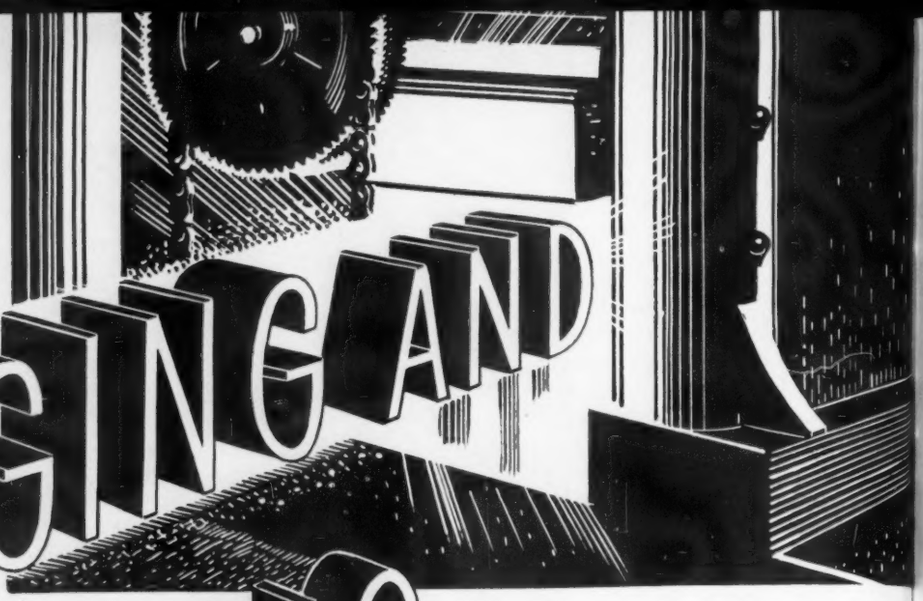
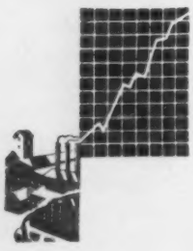


FORGING AND STAMPING

SIGNIFICANT development in the forging industry during 1936 was the trend toward lower weights and closer dimension limits so as to conform more nearly to the desired final shape and size. In commenting on this trend, R. H. Jones, National Machinery Co., Tiffin, O., points out that the latest high-duty forging machines are so built that the dies stay fully closed during the action of the heading tools on the hot stock, resulting in well filled forgings without the excessive flash of the past. Die alignment has been improved. Displacement piercing of deep holes and punching and trimming operations in the forging machine no longer are considered as "stunts" but are accepted practice. Forgings now are produced complete with holes ready for broaching and with no part line fins to be trimmed off; in fact, many forgings produced on these modern machines need no subsequent trimming whatever. Considering that every pound of material trimmed off a forging as flash, drilled out of a hole or machined off elsewhere as excess finish represents expensive material that must be carried in inventory, handled to and from the forge shop, heated and forged, and consequently must carry the same overhead as the forging itself, but with only an ultimate cheap scrap value, says Mr. Jones, it is obvious that the resulting savings have been so great as to guarantee a continuance of this trend.



Another important development, notes Mr. Jones, is a machine to coin forgings produced on high duty forging machines. In this press forgings are brought within thousandths of an inch of the finished size and thus made ready for high production chucking machines and grinders. Expensive straightening and hogging-off operations to fit the forgings to the finishing jigs are eliminated. Mr. Jones also regards as important design improvements which give instantaneous starting without appreciable shock and which increase capacity and at the same time give longer life to the wearing parts of these improved machines.

Some unusual forging installations were completed in 1936, comments Macdonald S. Reed, Erie Foundry Co., Erie, Pa., notably the new shop at Muncie, Ind., of Chevrolet-Muncie division, General Motors Corp. Two unusually large hammers were sold during the year. One is a 20,000-pound hammer to be used in England for drop forging airplane propellor blades and the other, a 25,000-pound hammer, to be installed in a commercial drop forging shop in Illinois.

Switch to a cast iron crankshaft by one large automobile manufacturer did not result in a general shift away from forged crankshafts, says Mr. Reed, and other companies in the volume production field, after devoting much thought to this subject, bought batteries of new hammers in 1936.

Mr. Reed stresses the fact that hammers fitted with the new flat valve cylinder are yielding much higher production. Despite the fact that one 1937 crankshaft, for example, weighs about 12 pounds more than its predecessor, the new 12,000-pound hammer is making this forging with fewer blows even though the new cylinder bore is 23 inches as compared with 27 inches in the previous hammer.

Demand for double-frame forging hammers in 1936

was unusually active, says Mr. Reed, particularly in the moderately heavy sizes. Due to design changes, capacity of these hammers has been increased greatly. In the field of board drop hammers motor driven units continue to outsell belt driven units. A development of the past year observed with interest was the construction of a number of motor driven board drop hammers which are self contained but have belt driven heads, being operated through V-belts from motors mounted on the backs of the frames; this construction is economical. In some other cases V-belt drive is being used but the motors, instead of being mounted on the hammers, are on a structure supported from the roof trusses over the hammers.

Steam drops outsold board drops in 1936 in a ratio of about 2 to 1, says Mr. Reed. He ascribes this largely to the demand for hammers in the larger sizes in which board drops cannot compete. Considering only hammers of the smaller rated sizes, he says, the board drops have held their own and they have run ahead of steam drop hammers in sizes in the neighborhood of 2000-pound.

Work still is being done on comparatively small hammers in which rapid blows and flexibility of control are highly important, thus creating a demand for 1000, 1500 and 2000-pound steam drop hammers. Mr. Reed notes that some of the new steam hammers have been installed for operation on compressed air, while a number of shops have changed from steam to compressed air on existing installations.

Production economies with drop hammer equipment of latest design also are stressed by R. E. W. Harrison, vice president, Chambersburg Engineering Co., Chambersburg, Pa., who points out that forgings are being produced with 1½ degrees draft, with a reduction of as much as 60 per cent in the amount of subsequent machining. As an illustration he cites a company which has pushed its production of connecting rod forgings from 10,000 to 30,000 by roughing the forgings under the hammer and coining them to finish sizes.

Longer Die Life Increases Productivity

Productive possibilities with modern forging machines or upsetters range from 40 to 50 pieces per minute, says R. W. Thompson, Transue & Williams Steel Forging Corp., Alliance, O. The main handicap in this type of forging operation lies in the inability of the dies to withstand the almost constant effect of the heat. Considerable research conducted by this company in developing analyses and heat treatment has resulted in a marked improvement in life of dies in this type of machine but the company does not feel that the possibilities yet have been exhausted. With a realization that proper heating is essential in producing quality forgings, says Mr. Thompson, furnaces of ample hearth surface to insure uniform heating without sacrifice of production have been installed. In these furnaces the temperature is controlled automatically by thermocouples located at the level of the forging billets so as to register the true temperature of the steel. In addition, heat supervisors who understand fuel atomization and can regulate the rate of heating and the duration of the soaking period have been employed.

The use of alloy steels for parts much larger than recently contemplated continues to expand slowly as recognition of their value in industry increases, says Dr. H. L. Frevert, Midvale Co., Philadelphia. Skill in the production of such large alloy forgings is gaining. Dr. Frevert points out that new construction for the Navy department has caused rehabilitation and expansion of special plant equipment long idle.

IN THE stamping industry there has been a marked trend toward higher speeds in production. R. B. Treer, chief engineer, Cleveland Punch & Shear Works Co., Cleveland, notes that large, heavy duty presses now commonly are operating at double the former speed limits. "Improvements in power press design and operation," says Mr. Treer, "have been the rule rather than the exception. The importance of studying the mechanical features from all angles is apparent when we consider that a type of clutch which has been used extensively for more than half a century has been so improved that the brake which formerly gave us so much trouble has for all practical purposes been eliminated.

"While streamlining has no practical purpose as such, except to improve appearance, it has been resorted to in a great number of cases for hiding many parts which otherwise clutter up a smooth surface, such as electrical wiring, oil lines, air lines, surge tanks and the like, and also for eliminating pockets and flat surfaces which have a tendency to collect dirt and other foreign substances to the detriment of the appearance of the machine."

Safety devices play an important part in modern press design, says Mr. Treer. Two interesting devices are interlocking pushbutton controls which prevent operation of the machine until all stations are ready, and overload devices which prevent damage to the dies. Selection of proper materials, such as high strength irons, alloy steel castings, heat treated crankshafts and connection screws constantly is being revised to assure generally improved performance, concludes Mr. Treer.

A notable expansion featured the stamping industry during 1936. This was due not only to the in-

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IMPROVEMENTS in dies and forging hammers have permitted production of forgings to new limits of dimensional tolerances, minimizing the amount of finishing work required

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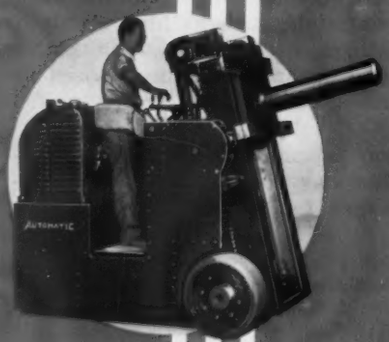

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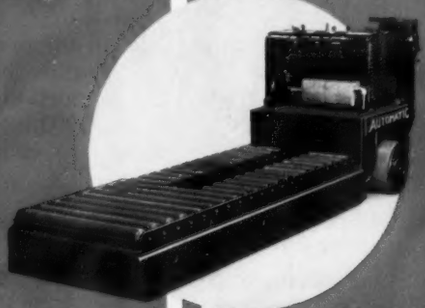
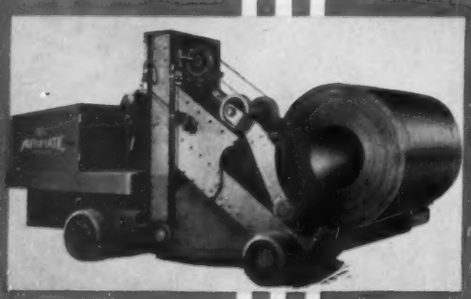
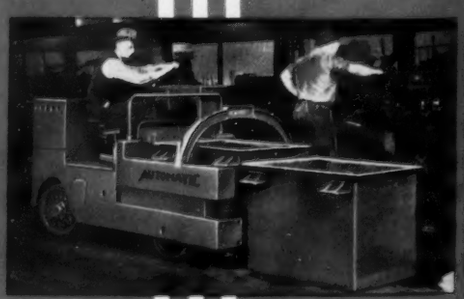


Special Low-Lift Platform Trucks with powerful motor-driven roller platform for quick sheet-steel pick-up at Rotary Shears and transportation to Storage or Shipping. Capacity up to 40,000 lbs.



Special powerful heavy-duty Coil Tractors with retracting coil cradle for side pick-up and transportation of strip steel coils from Picklers to Rotary Shears. Capacities 16,000 to 30,000 lbs.



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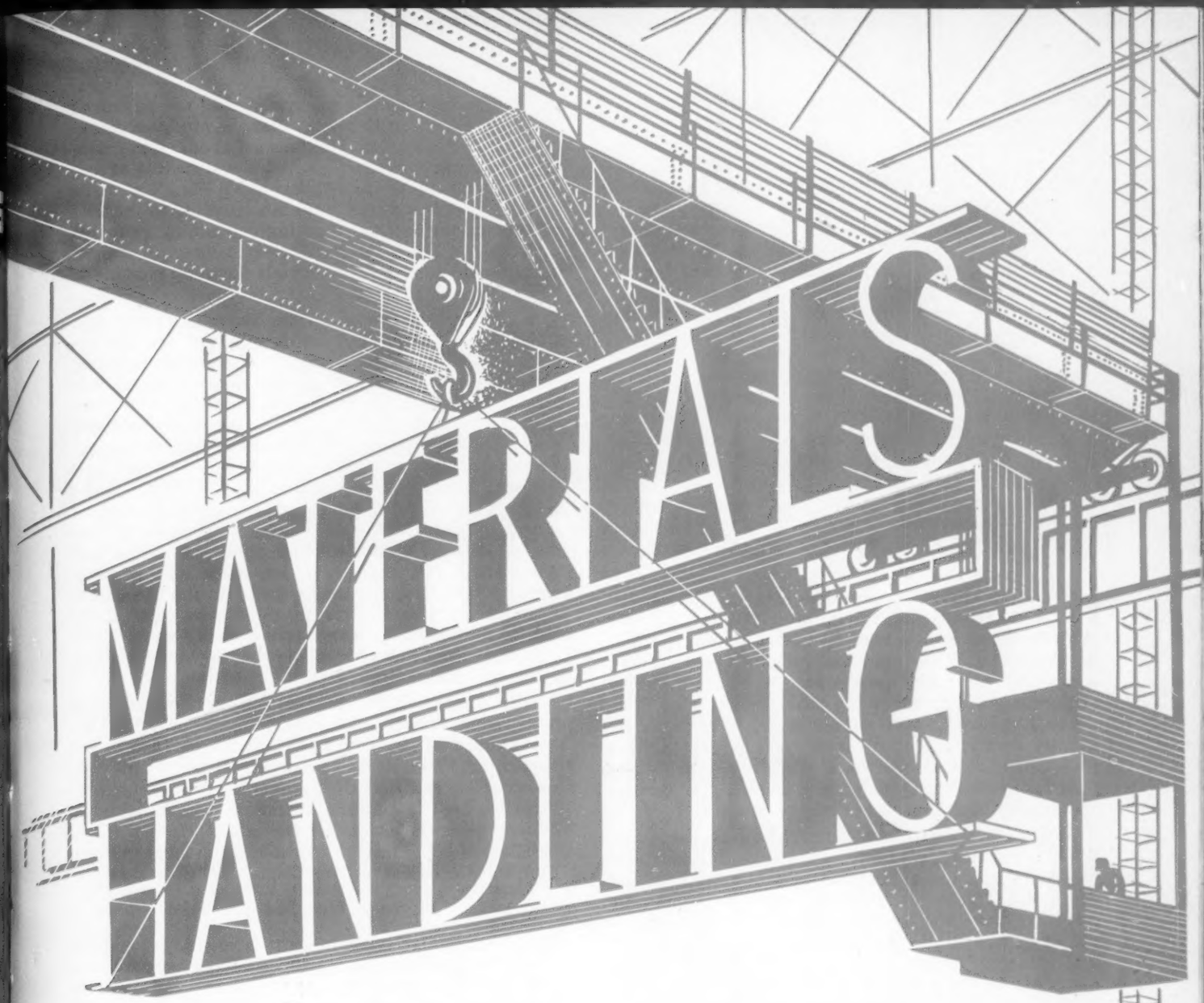


DURING 1936 the materials handling industry experienced its most successful business since 1929. Many individual manufacturers reported sales equal to, or greater than, those of that previous high year. General improvement extended to all branches of the industry, indicating a renewed emphasis which industrial executives generally are placing on better materials handling practices. Steel and metalworking industries particularly have been active in modernizing in this direction. General opinion prevails that, in spite of the progress made by the industry during the past twelve months, there will be a continued and strong demand for mechanical handling equipment during 1937.

Many factors are responsible for this activity. Predominant is the necessity of cutting production cost and of distribution to meet the new challenge of mounting charges which have been added to industry's burden in so many directions—costs of new social security legislation, higher wages and increased material prices, as well as almost every other major item entering into general cost determination. Another contributing factor is the shortage of skilled labor in many sections, demanding greater dispatch in serving productive workers with a continuous supply of parts and materials, and in eliminating bottlenecks which are sources of production delays and breakdowns. A third reason for additional reliance upon mechanical handling equipment is the impelling urge to make working conditions safer for and more attractive to employes by eliminating industrial hazards which have caused deaths and serious injuries throughout industry in the past.

Frank E. Moore, president, Mathews Conveyer Co., Ellwood City, Pa., in commenting on progress made during the past year, asserts: "I feel that since the development of the continuous strip mill and many other mechanized units which take part, there has come a materials handling consciousness to steel plant engineers which in itself is a step forward. There is little doubt that developments in the mechanical handling end of the business which have taken place will revolutionize present methods of handling in the steel industry. It is also probable that the development will have much to do with the quickening of the all-steel field, which easily can become a major market equaling the automotive volume."

A leading manufacturer of cranes and tramrail equipment

offers this opinion: "Industry is fast getting itself in preparation to meet business prosperity. There has been a tremendous increase in the number of orders received this year, the size of the individual orders and the total amount of business in the materials handling field. Likewise, inquiries are exceptionally heavy at this particular period. This general activity is reflected not only in the metal industry, but in others as well—textile, ceramic, paper, leather and lumber are all showing their quota of increased activity. Naturally, the metalworking industry, as far as this company's activities are concerned, predominates both in the volume of business and number of inquiries and, generally speaking, it predominates as to the size of the orders. The business is coming from all classes of industry and from all sizes of companies, the small industry doing its share toward modernizing as well as the larger one, orders running from a few lengths of rail to many thousands of feet, and from simple hand power carriers to special motor operated equipment and high speed motor driven carrier units."

H L. DONAHOWER, president, Standard Conveyor Co., North St. Paul, Minn., says: "During the past year there has been a marked tendency toward quality equipment in the materials handling field. There was a time, not many months past, when the majority of purchasers were primarily interested in price. This attitude, however, has almost entirely disappeared. Quality seems to be the major consideration at this time. Together with this trend there is also a distinct turning toward more automatic features in various operations than were acceptable previously."

Arthur L. Lewis, president, Lewis-Shepard Co., Watertown, Mass., also attests the definite indications of progress in the application of materials handling equipment. "Materials handling," says Mr. Lewis, "is receiving more and more attention. For many years, the effort was on the part of machine production, with little time or thought given to the movement of raw materials to the machine or of finished parts away from the machine. There was a considerable loss due to rehandling, which modern practice makes unnecessary; and there was the additional loss of machines being tied up because raw materials could not be moved quickly. Following this, there was a study of warehousing raw materials and finished goods; and materials handling equipment proved a worthwhile saving even though the movement was much less. Next came along the application of materials handling to the field of transportation; and trucking companies, railroads and traction lines found sufficient savings in freight house work to warrant materials handling equipment being purchased."

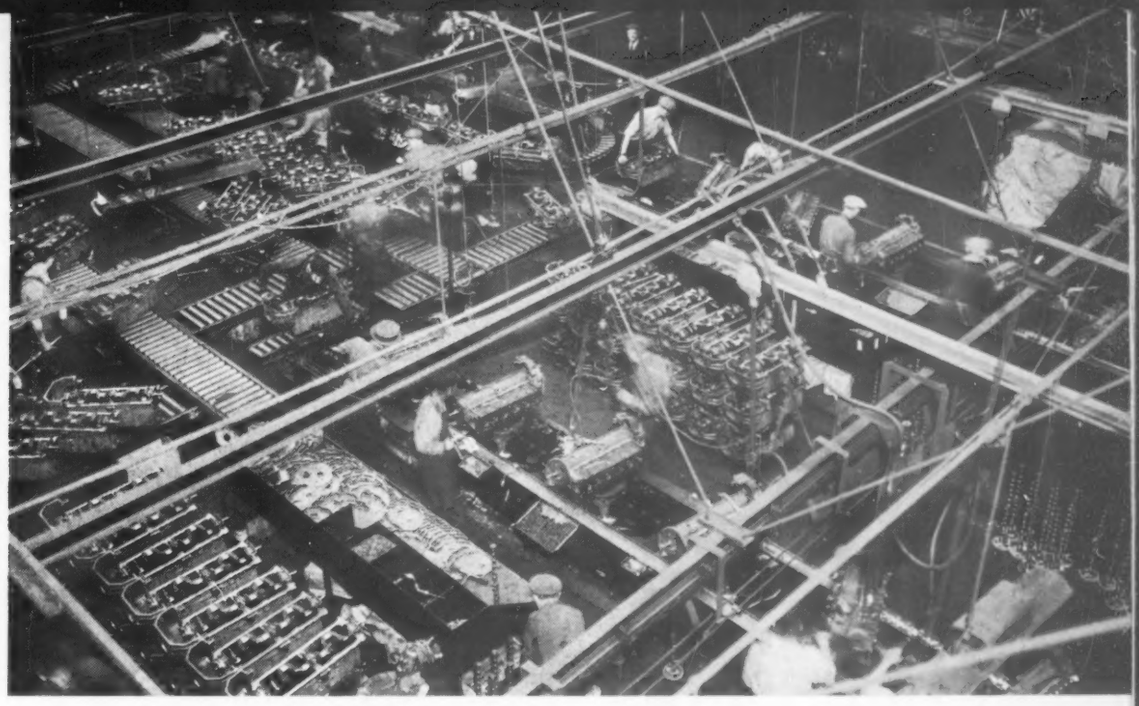
E. J. Heimer, vice president, Barrett-Cravens Co., Chicago, sees plenty of business ahead for the industry. He maintains that "all the materials handling industry has made acceptable and commendable strides in 1936. Yet, my personal observation in visiting several hundred plants the past year indicates there is still a considerable volume of business ahead. Not only the dilapidated condition of materials handling equipment still in use, but the old fashioned methods in use in some plants are nothing short of appalling. I honestly feel that in our particular industry we have little more than scratched the surface despite the fact that there are truck and portable elevator installations running well into the thousands. I feel perfectly safe in stating there is no plant in the United States which cannot economically spend a sizable amount of money right now on new, modern materials handling equipment."

R. C. Blair, manager of sales, Wright Manufacturing division of American Chain Co. Inc., York, Pa., believes that real progress was made during 1936 in the application of hoists in industry. "All plants are conscious of the fact that a large item in their total manufacturing cost is materials handling, consequently as money becomes available for appropriation, their handling is being mechanized to a much larger degree than was the case a few years ago," Mr. Blair states.

THE locomotive crane industry also enjoyed a share of the upturn, many machines having been sold for iron and steel scrap handling and for railroad, refinery and slag plant operations. J. E. Robertson, sales manager, locomotive crane division, Ohio Locomotive Crane Co., Bucyrus, O., says: "Our sales have been principally of the heavier type machines and about equally divided between diesel and gasoline power."

Alex R. Pribil, president, Saginaw Stamping & Tool Co., Saginaw, Mich., states that, in his opinion, the automotive and other industries are well equipped for real business prosperity. "The progress which has been made during the past year is more standardization on trolleys, wheels and chain rollers," he adds, continuing that "demand for our products has been equal to, or larger than, in 1929." There has been greater exploitation of pneumatic wheel equipment, many large installations of rubber tired wheels for wheelbarrows having been sold

THIRTY cubic yards of earth is just a mouthful for this huge electric stripping shovel in use at an Indiana coal mine. Compare the size with that of the automobile at the extreme left



SUBASSEMBLY roller conveyors in the Chevrolet engine block department are used as work tables. Main conveyors are of the double-chain type with fixtures for supporting the blocks

to steel plants in 1936. During 1936 steel mills have been large customers of the overhead crane industry. A larger number of heavy steel mill cranes was purchased than in many previous years. Some of the mills built in recent years were not prepared to handle the large tonnages which developed, and it has been necessary to add considerably to the materials handling equipment in order to meet heavy schedules. Much replacement work on cranes in the older mills is likely during the coming year. In the opinion of crane manufacturers, many plants are trying to get along with cranes that should be scrapped, or at least revamped with modern trolleys to give faster and more dependable service and hold down the cost of maintenance.

NEW equipment announced by manufacturers of materials handling equipment during 1936 included a wide variety, characterized chiefly by refinements to design of former types. In conveyors, there were new rollover devices, one for winding machine frames and others for turning coils of strip steel. One manufacturer brought out a new open-mesh all-steel conveyor chain belt. Several new types of protected bearings for gravity conveyors made their appearance on the market. A new design of conveyor roller, featuring a knock-down shipping idea; an automatic oiler for conveyor trolley wheels, and new truss-frame sealed ball bearing belt carrier were other additions to the list.

Many advances were made in design of industrial trucks. Featuring this entire line were ram and fork trucks of extremely heavy-duty capacities, some as high as 30 tons. Three manufacturers added to their models trucks with conveyor beds on the platforms, two of these being of the roller conveyor type, the other utilizing parallel chain conveyors. A gas-powered ram truck with capacity up to 4000 pounds; a gas-powered scoop truck; a tilting-tiering electric, or gas-electric, fork truck with 4000 pounds capacity; a heavy-duty center-control ram truck for coiled stock and a small gas-powered tractor were some of the many new trucks of 1936.

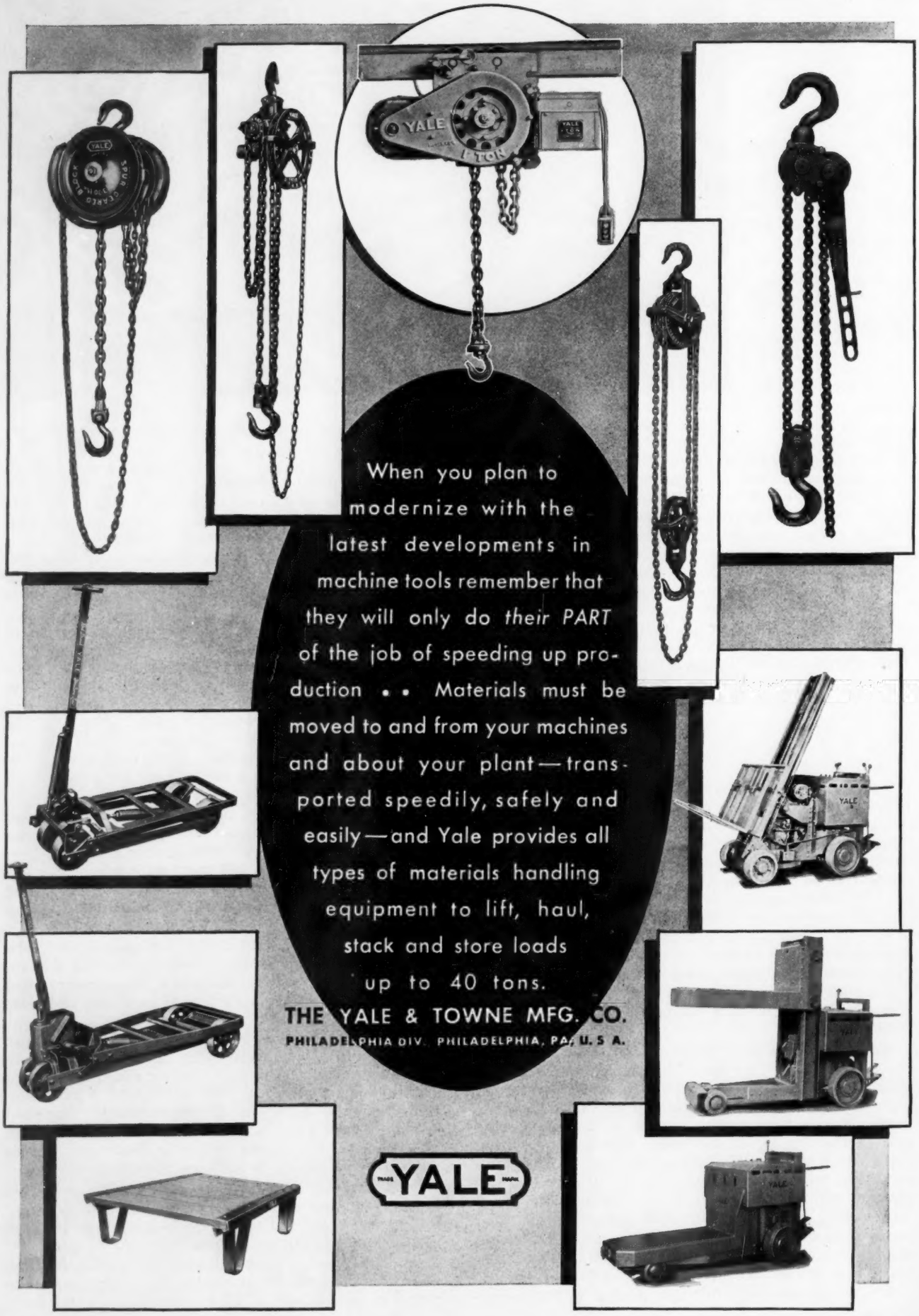
While comparatively few new designs of hoists appeared during the past year, there was a trend toward the broader application of hoist equipment for spot handling in industrial plants. A new high lift hoist for heavy duty; a twin-hook electric monorail unit ranging in capacities from ¼-ton to 3 tons; a lightweight hoist for spot handling loads of from 250 to 500 pounds and a spur-geared hand chain hoist in capacities from ¼-ton to six tons were added to available models.

In the hand-lift truck, portable elevator and skid branch of the industry, the following are some of the many recent developments: New skid platforms with reinforcement on ribs for additional strength; new clip for barrel runners on storage racks; a 15-ton hydraulic lift-truck; checkless lift-trucks of 6, 7, 9 and 11-inch heights; a carboy dumper on a portable elevator featuring safety to operator; a counterweighted fork-type pallet truck; a heavy-duty 4-ton lift-truck; hinged-frame trucks for heavy-duty lifting whereby the same truck may be used for low or high clearances; a lift-truck equipped with pneumatic tires; an auxiliary frame on a hydraulic lift-truck with 10-inch elevation; a heavy-duty lift truck with coupler for use with a tractor, and a new skid-carrying industrial trailer designed to link together the lift-truck-skid and the tractor-trailer systems of materials handling.

Floor truck advance for 1936 included a new type one-piece steel frame truck with industrial balloon tires and steel protected end; new low-pressure tires for industrial trucks; a variety of jack-lifts and platforms.

Shovel manufacturers were active during the year in producing new models. One introduced four new machines early in the year; another added a 2¼-yard convertible machine; a third announced a new convertible excavator; an electro-hydraulic clamshell bucket, a new 4-tine grapple with independent action of each tine, and a new finger-tip control to replace manual shifting of levers on power shovels were among the other developments in this line.

The past year was an active one for manufacturers of electric industrial trucks and tractors, as well as the gas-powered units. While statistics covering the month of December are not available at this writing, those for the first eleven months of the year show the industry sold a total of 1254 machines. Of this num-


When you plan to modernize with the latest developments in machine tools remember that they will only do *their PART* of the job of speeding up production • • Materials must be moved to and from your machines and about your plant—transported speedily, safely and easily—and Yale provides all types of materials handling equipment to lift, haul, stack and store loads up to 40 tons.
THE YALE & TOWNE MFG. CO.
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YALE

ber, 1188 were sold for domestic use and the remaining 66 were for export trade. Actual shipments during the eleven months totaled 1124 machines, 78 of them being exported.

To quote from a statement made by one of the leading members of this industry, there is a distinct trend toward specialized units built for one particular purpose. This applies particularly to those companies which have had large fleets of industrial trucks in operation over a period of years and have made no replacements of worn-out or obsolete types for some time. There is also a trend toward units of larger capacity and toward those units having the cleanest, most modern appearance. The fork type of truck has far outstripped other types within the past year as companies are beginning to realize that this type of truck, using inexpensive pallets and permitting high stacking and car loading and unloading, will give the best ultimate saving."

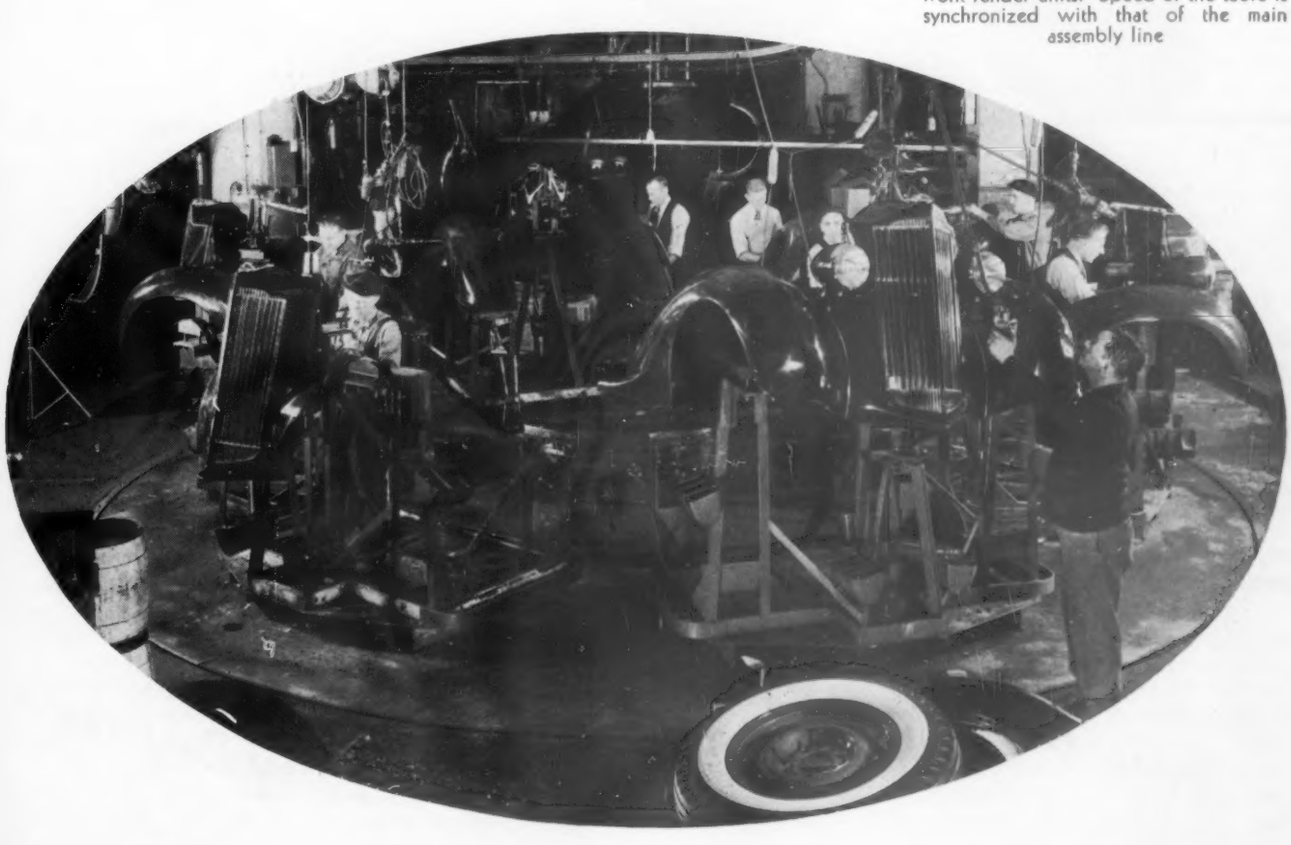
ONE of the most interesting developments in conveyor application is that for handling hot coils of strip steel on gravity rollers from the weigh scales to the craneway. One such installation was based on experience in handling smaller hot coils. This method has so far proved entirely satisfactory, and other similar systems are now being constructed to convey hot coils by gravity. In one now being built, the rollers will be filled with graphite which will be placed in them while assembling. This lubricant is said to resist the heat satisfactorily and to be inexpensive.

Bearings used in gravity rollers have been steadily improved. All-steel grease seals are becoming popular. The diameter of gravity rollers has been increased steadily to provide strength enough to withstand the impact of the heavy loads incident to quick handling of same. It has been found that this impact has been so severe as to spread the conveyor rails at times sufficiently to disturb the setting of the bearings in the tubing, thus considerably weakening the conveyor and rendering it unsatisfactory for movement of heavy loads by gravity. Acceptance of the heavier construction by production men is considered a decided step forward and one of the year's developments.

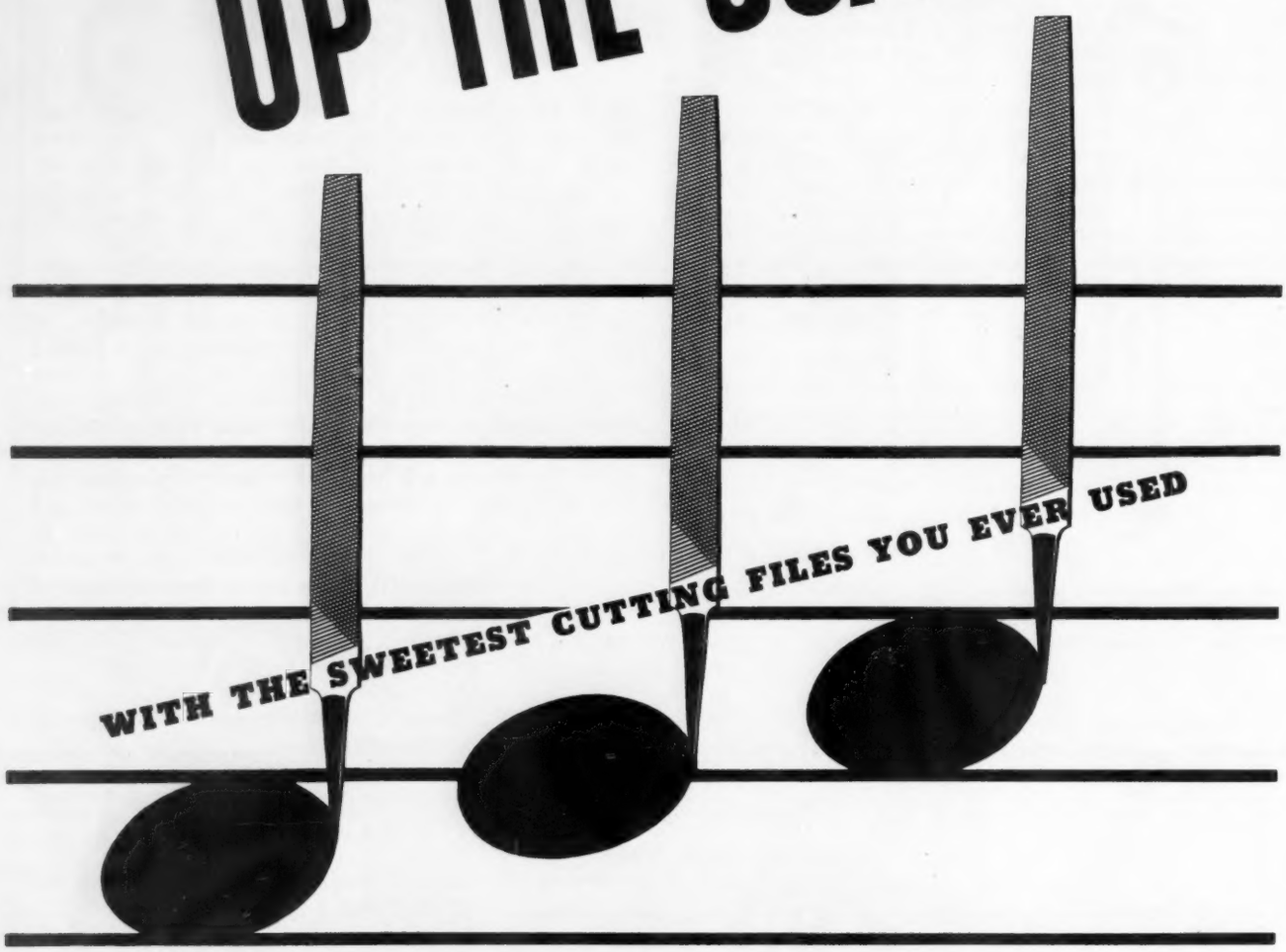
BAKER industrial truck division of the Baker-Raulang Co., Cleveland, during the past year added many new models to its line. In addition to a 10-ton elevating unit with a roller type conveyor on its platform, the company developed a 20-ton capacity platform truck with six lines of power driven chain conveyor on the platform arranged so that either right or left hand group of three chains each may be driven separately or simultaneously to permit handling of coils of varying widths. Other developments were a line of gasoline driven elevating trucks in modern streamlined design; a center-control fork and ram type truck; a "spark-proofed" unit for use in atmospheres charged with explosive dust such as bronzing powders; a low tractor originally designed for use by airports but used recently in coal mines and in plants where trailer loads of materials must be hauled through low tunnels; also a swivel fork attachment for high-lift trucks and a special design of straddle-type charging bucket carrier which readily carries a 4-ton load of pig, coke, limestone and other

(*Please turn to Page* 429)

PACKARD has solved a material handling problem by use of a turntable assembly station for radiator and front fender units. Speed of the table is synchronized with that of the main assembly line



UP THE SCALE



OF PRODUCTION EFFICIENCY

With the first stroke on metal the mechanic knows that Nicholson, Black Diamond and McCaffrey Files are "sweet cutting files."

These files start cutting with a minimum of effort. They cut easily and rapidly — stroke after stroke. They stay on the line of work and do not tend to skid off to one side or the other.

Because of their modern tooth construction, Nicholson, Black Diamond and McCaffrey Files are sweet cutting files and fast cutting. In an impartial hand test, one of our new 12" flat bastard files removed.

35% more bronze
25% more cast iron

than ordinary 12" flat bastard files.

Nicholson, Black Diamond and McCaffrey Files are the only ones with the tooth construction that makes this performance possible.

Try the sweetest cutting files you ever used in your plant. At mill supply dealers', hardware wholesalers'. Nicholson File Company, Providence, R. I., U. S. A.

PATENTS PENDING

Made In These Brands

NICHOLSON
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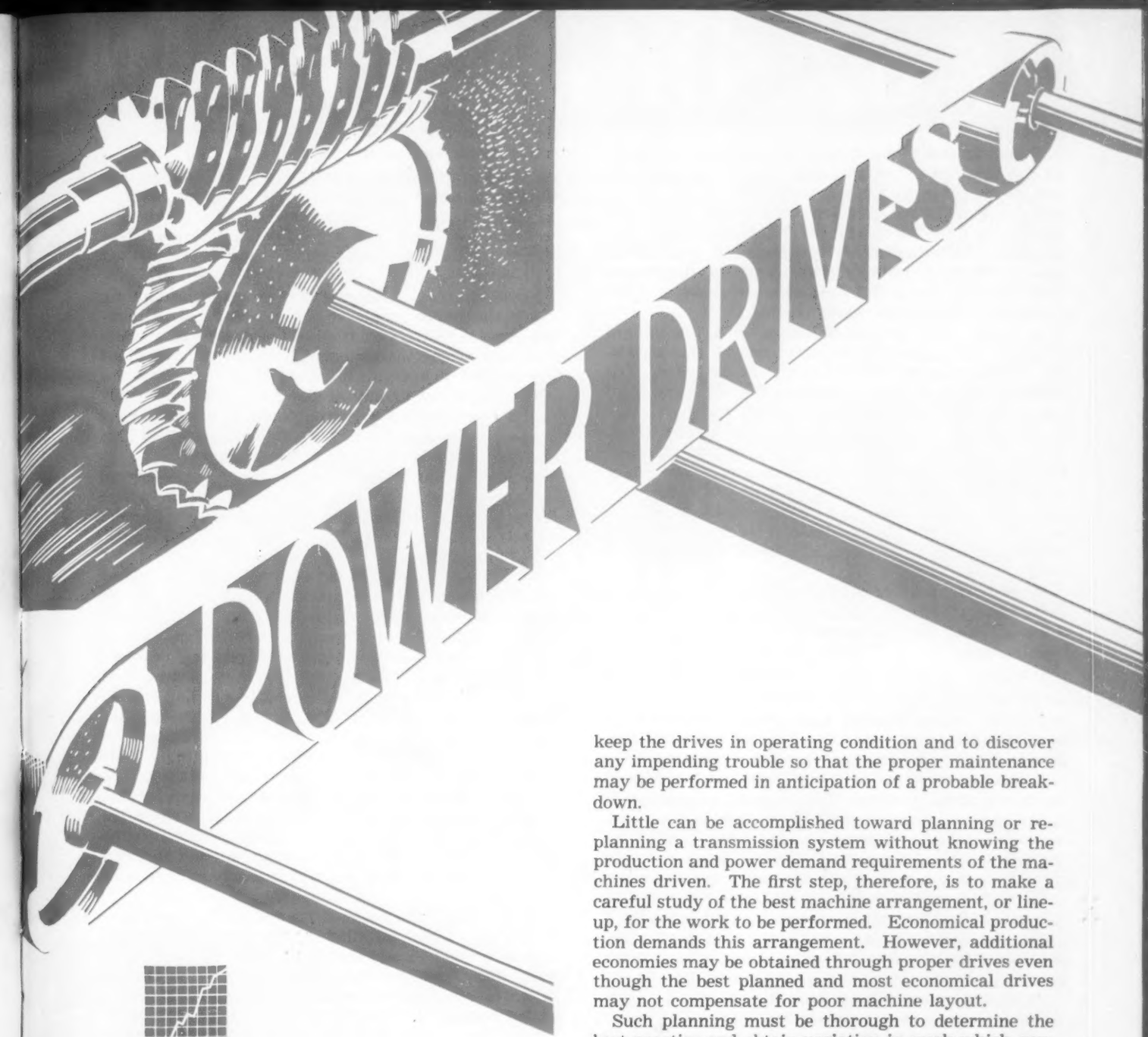
A File For Every Purpose



PROSPERITY, to industrial operating executives, means full capacity production. It is at such times that any failures or interruptions to operation count the most. Stoppage of an important machine or group of machines may result in a serious interference with production schedules. With three-shift operation it is almost impossible to "catch-up", since Saturday night and Sunday offer the only opportunities for overtime.

Incidentally, the question of payment for idle or waiting time of the operators was one of the underlying causes of dissatisfaction in a recent industrial strike. Lack of material is a more common cause of idle machine and operator than is drive trouble but the latter must be considered, as it is a "machine strike."

Prevention of drive trouble is obtainable in only two ways:

1. Careful selection and installation of the best drive equipment obtainable for the purpose.

2. Regular, systematic inspection and servicing to keep the drives in operating condition and to discover any impending trouble so that the proper maintenance may be performed in anticipation of a probable breakdown.

Little can be accomplished toward planning or replanning a transmission system without knowing the production and power demand requirements of the machines driven. The first step, therefore, is to make a careful study of the best machine arrangement, or line-up, for the work to be performed. Economical production demands this arrangement. However, additional economies may be obtained through proper drives even though the best planned and most economical drives may not compensate for poor machine layout.

Such planning must be thorough to determine the best practice and obtain variation in work which governs demand for power. With continuous production on a single item such studies are more necessary but more easily made. With varying product the problem is more complicated and may necessarily result in a compromise arrangement for layout and drive.

Before deciding on the transmission system it is necessary to know the power requirements of each machine through a complete cycle of operations, including starting, peaks, low points and duration of each. These data are most readily obtained by graphic meters which draw a chart record of the complete cycles. Time studies, however, will provide the operation cycle but not the power requirements, which may be obtained from the machine manufacturer, if no facilities exist for measuring load.

With these data of operation and power cycles the plant engineer can decide on group or individual drive, or a combination of both, most suitable to production requirements. Machines with widely fluctuating loads through the cycles but not having extreme differences in power requirements, can usually be group drives with considerable advantage in the cost of installation, annual fixed charges, power consumption, and also

maintenance, if the group drive is properly designed and installed.

Skimping on a group drive is not economy, as usually the extra maintenance and trouble resulting increases the operating costs, sometimes to an annual cost greater than the difference between the equipment installed and the best and most suitable equipment obtainable. Installing drive equipment of insufficient size or rating for starting and peak or continuous load requirements is the most common cause of drive dissatisfaction and operating trouble.

In many cases certain machines in a line-up are found to have operating requirements or characteristics which make individual drive more desirable. For example, where a few machines are much larger than the others in the line and have special, heavy, or widely fluctuating power requirements considerably above the normal variations of the others, which would disturb the power load and not balance in with the smaller machines, it is often better to drive individually as one of the advantages of group drive is an evenly balanced motor load. In other words it is seldom good practice to mix very large and small machines in a group drive.

Some of the fundamentals underlying modern group drive design and installation, as given by Victor A. Hanson, chief engineer, Power Transmission council, Boston, are:

1. Design all mechanical transmission equipment of ample size and capacity with respect to peak and starting loads. Much existing transmission equipment is overloaded, causing costly breakdowns and short life. Ample capacity is insurance against such trouble.

2. Support shafts at all major points of load. Steel stringers make possible this support regardless of building construction or machine arrangement. Provision for support at points of load make possible an increased safety factor, reduction in shaft size and weight, and minimum shaft whip and misalignment.

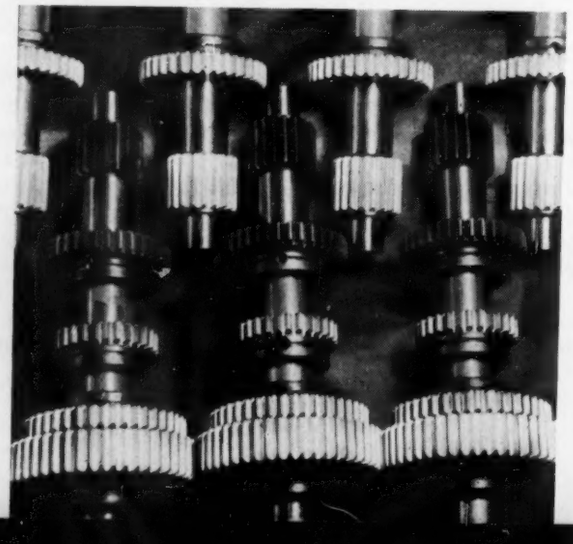
3. Plan drives so they can be easily moved and aligned. The steel stringer construction provides a sliding assembly, making possible the alignment, alteration, or the complete moving of the drive without tedious drilling or expensive alteration labor.

4. Operates drives at relatively high speed. This permits the use of transmission equipment of minimum size. Drives where the speed is reduced between motor and shaft and at the same time being increased between the shaft and machines should be avoided wherever possible.

5. Avoid the use of individual machine countershafts wherever possible. Instead, mount machine drive pulleys on the main shaft and for start and stop processes provide them with modern-type clutches equipped with antifriction bearings. Any type of pulley, sheave or sprocket may be installed in this manner, thereby eliminating much excessive equipment and reducing power losses.

6. Use antifriction bearing equipped hangers, pillow blocks, etc., thereby utilizing the improvements of modern equipment to save in power and maintenance.

7. Select motors of a size to be economically loaded with high power factor designed into the drive. Study the possible use of synchronous motors for both high power factor and constant speed.



In planning drives, particularly in deciding on whether to use group or individualize, no set rule can be followed. In many cases some or both may be the best practice. Seldom is it good policy to force drives into one or the other types merely because one method is preferred.

Fixed charges on investment, power consumption, and maintenance of power drives are items of overhead, and with the exception of power and, to a somewhat less extent, maintenance are practically constant irrespective of how much or how little the drives are used. Reduction of any of these items is practically solely dependent upon thoroughness of the engineering or planning of the drives before they are installed and the choice of suitable drive equipment.

Reduction in overhead is a direct saving or reduction in expense and is well worth considering in power drives. This is emphasized in the following statement by J. L. de Rabot, consulting engineer, Alexander Bros. Inc., Philadelphia:

"I believe the greatest development in power transmission practice at the present time lies in the increased interest shown by the industry as a whole in a better utilization of power. This condition, I think, may be the result of the depression, people having today a better sense of economy than they used to have.

"The old saying 'a dollar saved is a dollar earned' applies. Whatever method is used to save a few dollars on power drives and the power bill is good as long as the method is practical and the economy real. With this problem in view, it is apparent that the use of better power transmission equipment and more refined applied engineering are strictly in order. Therefore, better belts, use of antifriction bearings, better selection of pulleys for the job in view, production of cheaper power, are things about which one has heard a lot this year."

Even though the power drive system has been carefully planned and installed, a regular systematic routine of inspection and servicing must be organized to keep the system functioning properly. The type of organization of personnel and frequency of inspection and servicing is determined by the operating conditions. Dusty and dirty surroundings, high temperature, humidity, high speed, shock or continuous heavy load, all increase the necessary amount and frequency of servicing and inspection.

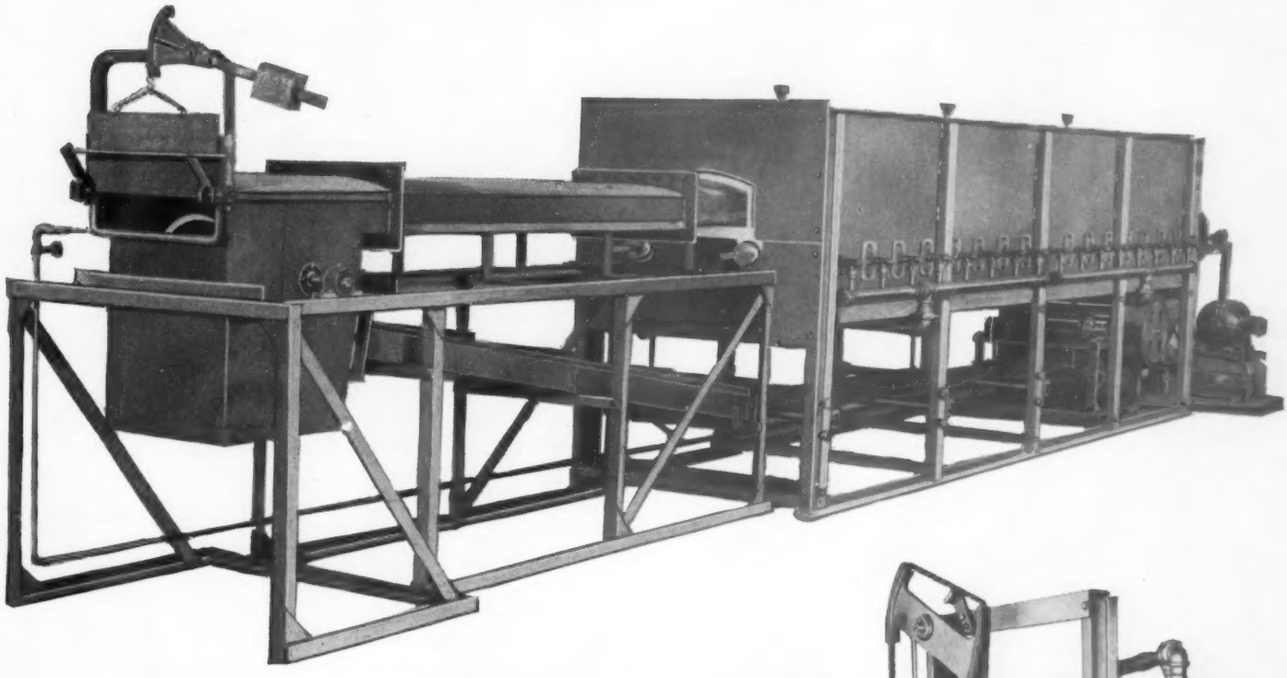
Manufacturers of production and drive equipment, including motors, are continually improving their products so that they will require less frequent servicing. Better bearings and improved facilities for lubrication as well as higher grade lubricants for every type of service are modern aids to maintenance.

With these lengthened periods between servicing it is no longer possible to rely on memory to see that each piece of equipment is looked after at the proper time. These set inspection periods for motors vary in one plant from two weeks to two months for motors un-

(*Please turn to page* 423)

PIONEERING AGAIN

Not all the pioneering was done by our Forefathers. The American Gas Furnace Company is proud of its pioneering in the heat treatment of steel—The first gas air blast furnace, the first Automatic Temperature Control, the first automatic Heating Machine, gas carburizing, nitriding, etc., etc.—And now pioneering again we offer *"Ni-Carbing", the new gas-surface-hardening process.*

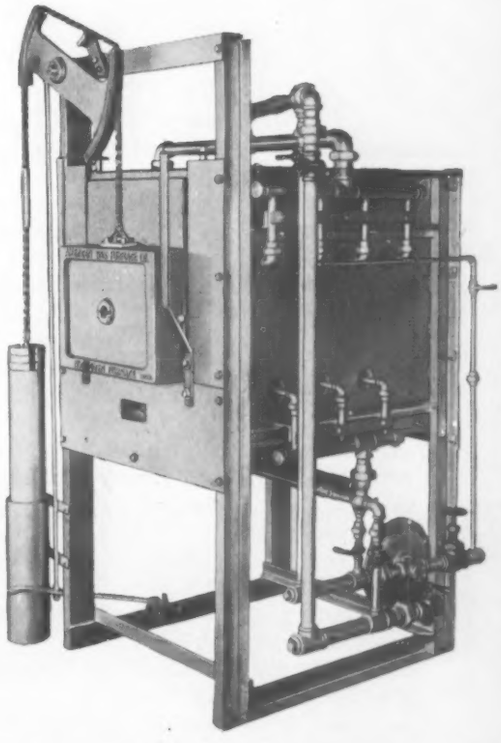


"Ni-Carbing" gives a hard surface with considerable resistance to corrosion, regardless of whether parts are quenched from temperature or cooled in the treating gas atmosphere. The "Ni-Carbing" process can be carried out in various types of machines. Here illustrated is a mesh belt conveyor Heating Machine with a full muffle and cooling extension for "Ni-Carbing" parts which were formerly cyanided.

Improved Pot Hardening Furnaces with numerous burners for uniform heat distribution, insulating refractory lining backed by block insulation, single valve control, and down draft arrangement.

AMERICAN GAS FURNACE CO. PIONEERS IN 1878 LEADERS TO-DAY.

Write for Bulletin S137 for further information.



Something new in Oven Furnaces. Over and under firing and bottom venting which any engineer will agree is fundamentally correct are combined to give controlled atmosphere, greater economy and quiet operation.

American Gas Furnace Co.

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Engineering Representatives in Principal Cities

HEARTENING progress was made in the endless fight against corrosion during 1936. Not only have finishes been improved from the standpoint of corrosion resistance, but beauty, flexibility and wear resistance have been increased as well. Methods and equipment have been brought to new heights of efficiency and economy. Modern design has been recognized as a distinct necessity. Vigorous research programs have borne fruit with promises of more to come. Educational programs have been pursued to train both producer and consumer. However, no one is resting on his achievements and the competitive search for something better is hotter than ever.

To begin with, steel producers are now rolling strip steel with a surface finish designed to insure adherence of lacquers and enamels without preliminary surface preparation on the part of the enameler. Initial research was carried out by the Westinghouse Electric & Mfg. Co. This company was convinced that sheet steel of the type used for refrigerators could be furnished with a surface of the proper degree of roughness to insure firm adhesion of enamel without sandblasting or other roughening methods. Among the commercial sheets furnished a few were found satisfactory. These were examined under a microscope and after a detailed study a specification was written using photomicrographs of the satisfactory steel as a basis. At the present time Westinghouse buys its steel according to these specifications, using a microscope to check each carload of steel as it is received. By this method a carload of steel can be inspected with accuracy in a few minutes.

Demand for steel meeting surface specifications is growing and it is safe to predict that increasing vol-

umes of steel will be sold on the basis of the surface treatment to be used.

Real progress in the fight against corrosion is evidenced in the development of chemical surface treatments during 1936. American Rolling Mill Co. has placed on the market a chemically treated galvanized sheet under the trade name of Paintgrip. These sheets are treated to form a zinc phosphate surface which not only increases the life of the sheet but enables paint to cling tenaciously. Heretofore the problem of making paint adhere to galvanized metal has never been solved satisfactorily.

Closely related to the above is the electro-granodizing process of American Chemical Paint Co., Ambler, Pa. In this process steel parts are given a coat of zinc phosphate directly in an electrolytic bath. This coat not only thoroughly rustproofs the surface but forms an excellent base for paint. The automotive industry was quick to see the advantages of this process and uses it on parts subject to corrosion.

POSSIBLY one of the most significant steps in corsion prevention was application of a scientifically sound system of rustproofing treatment to structural steel. Thompson & Co., Pittsburgh, has developed a system of correlated chemical treatment and inhibitive paints known as the Synhibit process. In this process rust and scale are removed as far as possible with a wire brush and the entire surface of the structure is treated with a chemical rust inhibitor containing both phosphoric acid and a chromium compound. A complex iron chromium phosphate surface is formed which furnishes a base for a specially formulated rust inhibiting, zinc chromate, iron oxide, synthetic vehicle primer. A specially formulated aluminum finish coat is recommended because it has been found to be more durable than graphite or other pigment base films.

"The past year has shown a very decided interest in aluminum in hot-dip galvanizing baths," says Wallace G. Imhoff, Wallace G. Imhoff Co., Vineland, N. J., "and in setting up a specification for the amount of this metal in each field of galvanizing. Only those familiar with complicated nature of controlling the various metals and alloys used in galvanizing can appreciate the difficulties involved in this matter," he continues. "However, definite progress is being made, and a thorough study of the whole question is now being undertaken by a number of research investigators and technical societies."

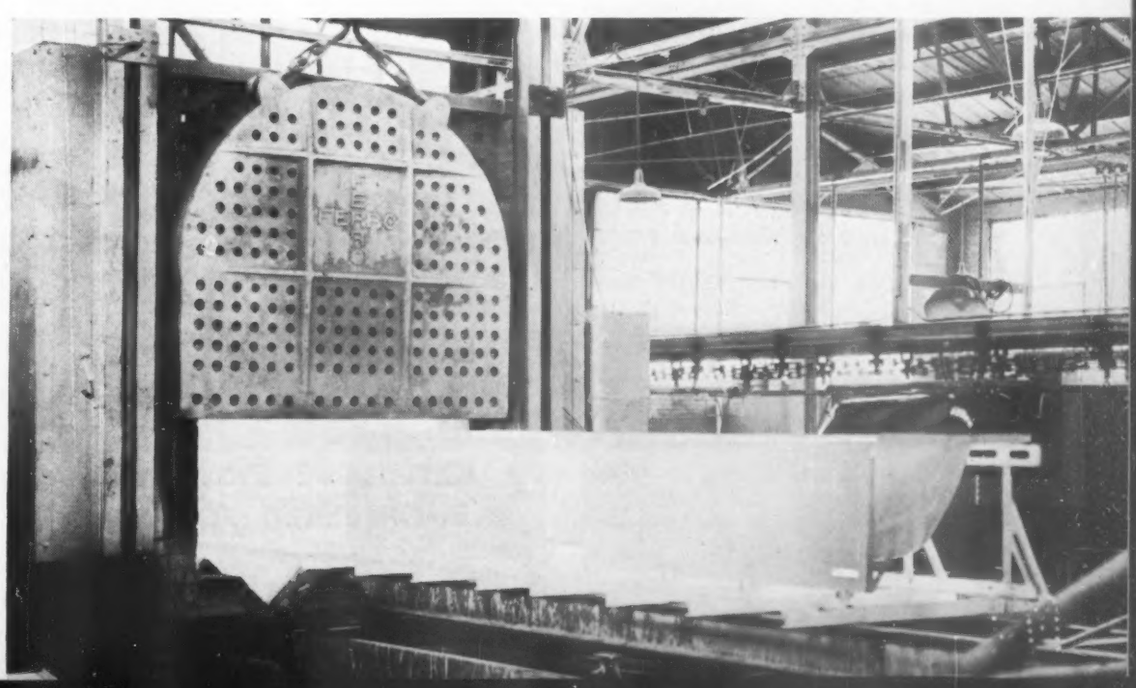
Mr. Imhoff states, "The past year has witnessed a marked increased interest in the development of a satisfactory hot-dip galvanizing furnace. This is one of the most difficult of all industrial heating problems due to the rapid destruction of the pot itself, the increase of by-products and excessive jump in costs when the furnace is not satisfactory. A development in this field of engineering is the invention of a new type of furnace. Basic features involve a new type of application of the products of combustion of the fuel without coming in direct contact with the pot. One furnace has already given four times the pound life of the furnace it replaced, lowered dross production, improved operating conditions, and lowered costs.

"The past year has seen a number of hot-dip galvanizing companies installing automatic temperature control, recording electric pyrometers, and making temperature surveys of galvanizing baths. The prime importance of uniform temperature in galvanizing is being realized gradually by the industry.

"An entirely new principle of galvanizing," Mr. Imhoff concludes, "namely the importance of the submersion to the weight of coating, has been taken advantage of by one of the largest hot-dip galvanizing companies. A special device has been made which will definitely control the submersion time of each article in the galvanizing bath."

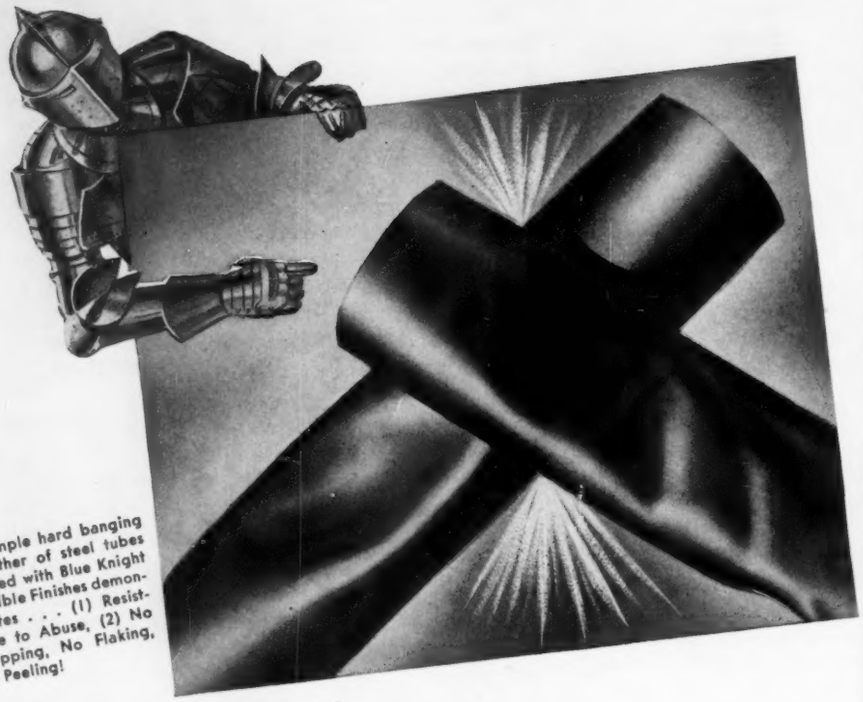
The developments in high current density methods of electrogalvanizing have received wide public notice. Notable among these are the Bethanizing process of Bethlehem Steel Co. and the electrogalvanizing process of the Meaker Co., Chicago.

COMMENTING on the strides made by electroplating industry, C. W. Yerger, Hanson-Van Winkle-Munning Co., Matawan, N. J., advises, "Backed by the



BATHTUBS of pressed steel have provided new fields for porcelain enameling. Here are two enameled tubs emerging from a firing furnace

FLEXIBILITY AND ADHESION



A simple hard banging together of steel tubes coated with Blue Knight Flexible Finishes demonstrates . . . (1) Resistance to Abuse, (2) No Chipping, No Flaking, No Peeling!

Six words WORTH KNOWING

NO CHIPPING! NO FLAKING! NO PEELING! The dollar value of these six words is the most significant interpretation of two vital components of Blue Knight Flexible Finishes . . . permanent Flexibility and permanent Adhesion.

Roxalin products have long been known (since 1924) for possessing these *finish-life* factors to an outstanding degree. And they are the foundation characteristics of a long list of Blue Knight surface coatings which are engineered for specific performance. (*See Column at right.*)

A wide safety zone of Flexibility and Adhesion acts as a cost and service safeguard. It eliminates rejects and refinishing in fabricating and assembly operations. In shipping and warehousing, rough or abusive handling does not result in marred finishes. On aging, either in storage or in dealer's hands, no brittling of the finish occurs.

When we refer to NO CHIPPING, NO FLAKING, NO PEELING . . . it's just another way of saying, "*To do its job, a surface coating* MUST REMAIN INTACT!"

See our display in the Exhibition Quarters of Metals & Plastics Bureau, 3rd Floor, International Building, Rockefeller Center, New York City.

Plus!

Corrosion-Resistance
A Technical Triumph

A long-lived and fully flexible BLUE KNIGHT finish known as ROXYN-C is now in successful commercial operation producing films (*in clear and all colors*) that are impermeable to corrosive influences, such as:

Constant cycles of Cold and Heat; Humidity, Brine, Refrigerant Fumes; Alkaline Washing Compounds; Pure Alcohol; Perspiration.

ON REQUEST an interesting printed summary of ROXYN-C will be mailed to your attention. Numerous production advantages are detailed.

Controlled Wrinkling
In Texture Finishes

RINCON-TROL is a widely used Blue Knight texture finish, which produces no "fat edges," irrespective of thickness or thinness of coats.

A shining illustration of the adaptability of RINCON-TROL is the large surface coating of an air-conditioning unit measuring 9'x5"x2' . . . heretofore considered a feat impossible to accomplish with complete success. For small surfaces, such as small die-castings, typewriters, car radios, heaters, this Blue Knight controlled - wrinkle finish is outstanding, especially in view of its high resistance (*impermeability*) to the corrosive effects of perspiration.

ON REQUEST a die-casting or panel (*state which*) finished with RINCON-TROL will be mailed to your attention. You will see for yourself the rich effect of the texture, and the complete freedom from "fat edges."

Please address your request to ROXALIN FLEXIBLE LACQUER CO., INC., Box 471 Elizabeth, N. J.

ROXALIN *Flexible* FINISHES

CELLULOSE & SYNTHETIC TYPES
ENGINEERED FOR SPECIFIC PERFORMANCE

demand for more attractive and more protective finishes for metals, the confidence of increasingly better business conditions and a realization of the widening applications for metal finishes, the electroplating industry has shown substantial progress during 1936 in method, control, application and new developments."

"Most noticeable," he continues, "has been the concerted effort on the part of steel companies toward the perfection of the process and installation of equipment for cleaning and electroplating continuous wire and strip.

"Strides have been made in the further development of plating processes, especially in the field of alloy bright nickel plating where operation has become simple and the results are of uniform quality in every day commercial production.

"One of the oustanding introductions to the plating industry in 1936 was that of the homopolar generator for use with the Tainton process of zinc deposition on steel wire. This generator, the success of which is of greatest importance to the electroplating industry, is constructed without armature windings or commutator, which permits concentration of unusually large amperage in a single unit at exceptionally high efficiencies."

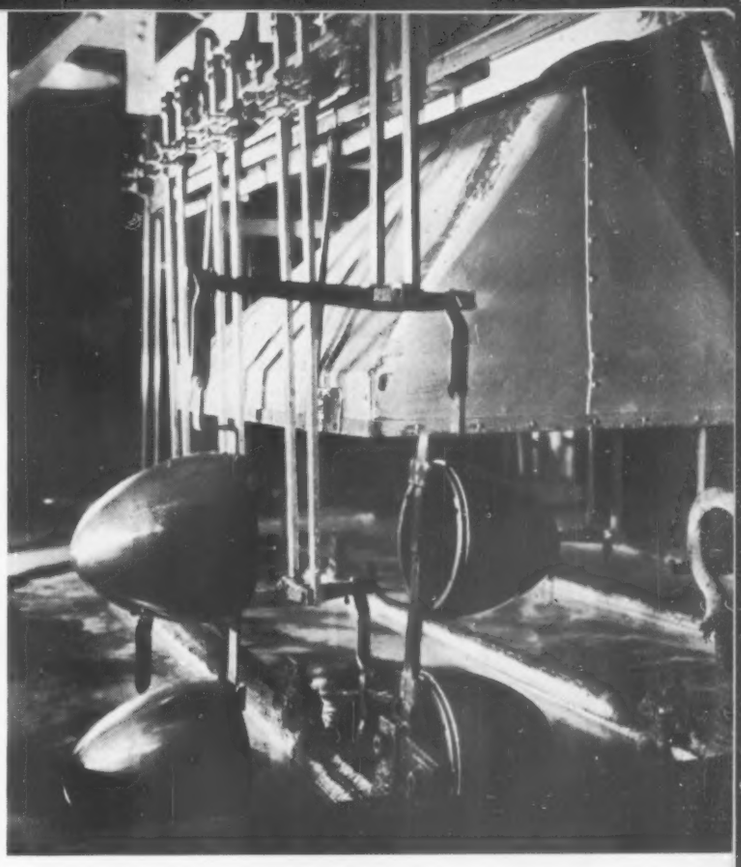
A strong proponent of chemical research and control, Mr. Yerger observes that "manufacturers of electroplating equipment and supplies are realizing more each year the necessity of research, looking toward the development of plating and allied problems. Finishes are being developed which eliminate considerable labor in the final preparation, steel is being prepared better in mills for better plating later and the use of technical methods of control is being developed to a higher degree than ever before."

One result of this research is the production of the copper oxide type of rectifier, to be used in place of low voltage generators, which has been developed to a point where exploitation in 1937 is expected to be extensive.

INTRODUCTION of the electro-tin process combined with strip steel, will, we believe, be a serious competitor with the hot-dip tin process," says Dr. Colin G. Fink, head of the division of electrochemistry, Columbia university, New York. Electro-tin plate is practically free from pinholes. The second outstanding development in electroplating is the development of manganese plating. Three laboratories have contributed to this development and we look to 1937 as an important year for further industrial accomplishments in electromanganese. In the past, pure manganese was a mere museum curiosity. Now it can be made in quantity at relatively low cost."

"The general acceptance by the steel industry of the continuous strip mill," he adds, "means that much of the electroplating will be done on strip before forming, drawing and spinning. In other words, nickel plated, chromium plated and copper plated steel strip will be furnished to the fabricators of escutcheons, reflectors and a variety of steel hollow-ware, eliminating most of the handling now necessary in first forming and then plating.

"We look forward to 1937 for further developments in aluminum coated steel. The indications at present are most favorable. What has been accomplished



ELECTROLYTIC coating of zinc phosphate provides protection against rust to these steel auto headlamps. Treatments of this type are being applied to an increasing number of parts

by one steel company in introducing electrogalvanized steel wire undoubtedly can be duplicated in a variety of other combinations such as nickel-chromium coated steel wire for high temperature resistance, and many others."

Opinion appears unanimous that chemical research and control are necessary in electroplating. Long programs of research are bearing fruit and the results are having a definite effect upon commercial plating. W. M. Phillips, chemical department, research laboratories section, General Motors Corp., Detroit, says, "The work of the American Electroplaters' society, the American Society for Testing Materials, and the national bureau of standards resulted in the setting up of specifications for the plating of steel and steel parts. This work was the result of three years of investigation, during which time 7000 panels were exposed in many sections of the United States so as to get a great range of climatic conditions. These panels were prepared at the bureau of standards and involved different types and thicknesses of plate. Prior to this investigation there was but little positive knowledge on the subject. A most encouraging factor is that industry made a nice attempt to meet these specifications and a great improvement in the quality of the work turned out was noticeable as compared to that of as recent a date as 1935.

"In preparing for increased industrial activity," Mr. Phillips says, "it is particularly true of the automobile industry that equipment of the latest design and greater capacity has been purchased in anticipation of greater volume and more prosperous conditions. As a matter of fact, this movement took place long before the immediate business expansion

(*Please turn to Page* 414)

Whitey Sez:

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WITH the greatly increased volume of business in the manufacturing and construction fields in 1936, all forms of welding were utilized in increasing proportion. This method of fabrication was given more generally acceptance, although in some directions research and service data are required to win approval. Needed particularly is a better knowledge of the residual stresses in a structure after welding. A need exists for experienced designers and welding operators with proper qualifications. In spite of this highly favorable picture for the welding industry, construction by riveting appears not to have suffered, for rivet manufacturers have witnessed increasing demand for their product.

New developments in welding naturally attract attention, but the thing that is most impressive is the increased confidence in and acceptance of welding, asserts R. B. Lincoln, director, National Weld Testing Bureau, Pittsburgh Testing Laboratory, Pittsburgh. This may not be as spectacular as some of the new processes, but it has great commercial importance.

Men who do not believe in welding are becoming increasingly rare, he continues. Actually, it has been a number of years since high-quality, reliable arc welding became common; however, several years had to elapse before the facts were recognized. Today, welding may be said to be the leading method of joining metals when strength or tightness is important.

The steel industry is actively interested in the promotion of welding and the reason is obvious, comments Leon C. Bibber, welding engineer, Carnegie-Illinois Steel Corp., Pittsburgh. It is interesting, he says, that this industry which, generally speaking, has no welding supplies or equipment to sell, is aggressively campaigning for this means of joining metals. It is believed that the entry of this new champion into the field will go far in furthering the use of welding.

Because of many outstanding processes and products in the welding field, the steel industry does not deem it necessary to advocate a particular process or product to insure satisfactory results, Mr. Bibber states. The steel industry has pioneered service in connection with its own products, and the metallurgical service in connection with forging, forming, heat treating, etc., is now broadened to include welding.

It is felt, he points out, that instruction in the designing and construction of such products is a legitimate sphere of activity for the steel industry. No doubt there are many who have found that "weldments" were in some cases relatively expensive. However, it does not follow that because these particular products were more expensive that they need be more expensive in the future. By use of ingenuity in design and by taking advantage of all the latest welding developments, Mr. Bibber concludes, costs can be reduced, and it is safe to say that, except in special cases where the object requires special forming, generally speaking, a satisfactory and economical product can be built by welding.

In the opinion of W. Spraragen, technical secretary, American Welding society, New York, advance-

ments in welding are not at a standstill. During the year, considerable progress was made in developing suitable techniques for welding a number of the important low-alloys steels. Many problems in this field, however, remain to be solved; the co-operation of the steel companies in developing low-alloy steels having favorable welding qualities is essential.

Although applications of resistance welding all told constitute the largest amount of welding by any process, nevertheless, points out Mr. Spraragen, this branch of industry has been the most backward in the matter of research. Optimum welding conditions, such as currents, pressures, size and shape of electrodes and time of welding, still remain to be solved even for the most common every-day applications and in welding some of the newer alloys the wide range of permissible variations in each of these variables is not possible. A great deal of opportunity exists for research in this field on a co-operative basis and by individual companies and universities.

In general, however, states Mr. Spraragen, welding developments and research have kept apace and he is quite confident that the welding industry will be able to produce welds with the requisite physical properties in the newer alloy steels, providing they meet certain fundamental requirements of weldability.

ACCORDING to C. H. Jennings, research department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., the art of arc welding has continued to develop during the past year in the typical manner which has characterized its progress during the last decade. The fundamental knowledge of welding has been increased substantially by extensive research and this knowledge has been applied to improve the quality of many welded structures.

Welding electrodes and machines have been developed and improved to a higher degree making possible more rapid and economical welding and higher quality welds. New methods of automatic welding with the shielded arc and development of hard-facing materials for tipping cutting tools are outstanding in this field.

Welding procedures have been improved, asserts Mr. Jennings, with particular thought being directed toward the reduction of distortion and residual stresses. Advancement in the knowledge of welding stresses and distortion has opened new fields for arc welding and made possible its application on structures that would have been questioned several years ago.

Metallurgical knowledge of the weldability of alloy steels has improved vastly, thereby making possible the extended use of arc welding on such steels. The theory of preheating and subsequent heat treatment has been investigated and the information obtained applied in practice. Proper procedure in welding alloy steels eliminates welding troubles and insures strong and ductile welds and a satisfactory fusion zone, Mr. Jennings says.

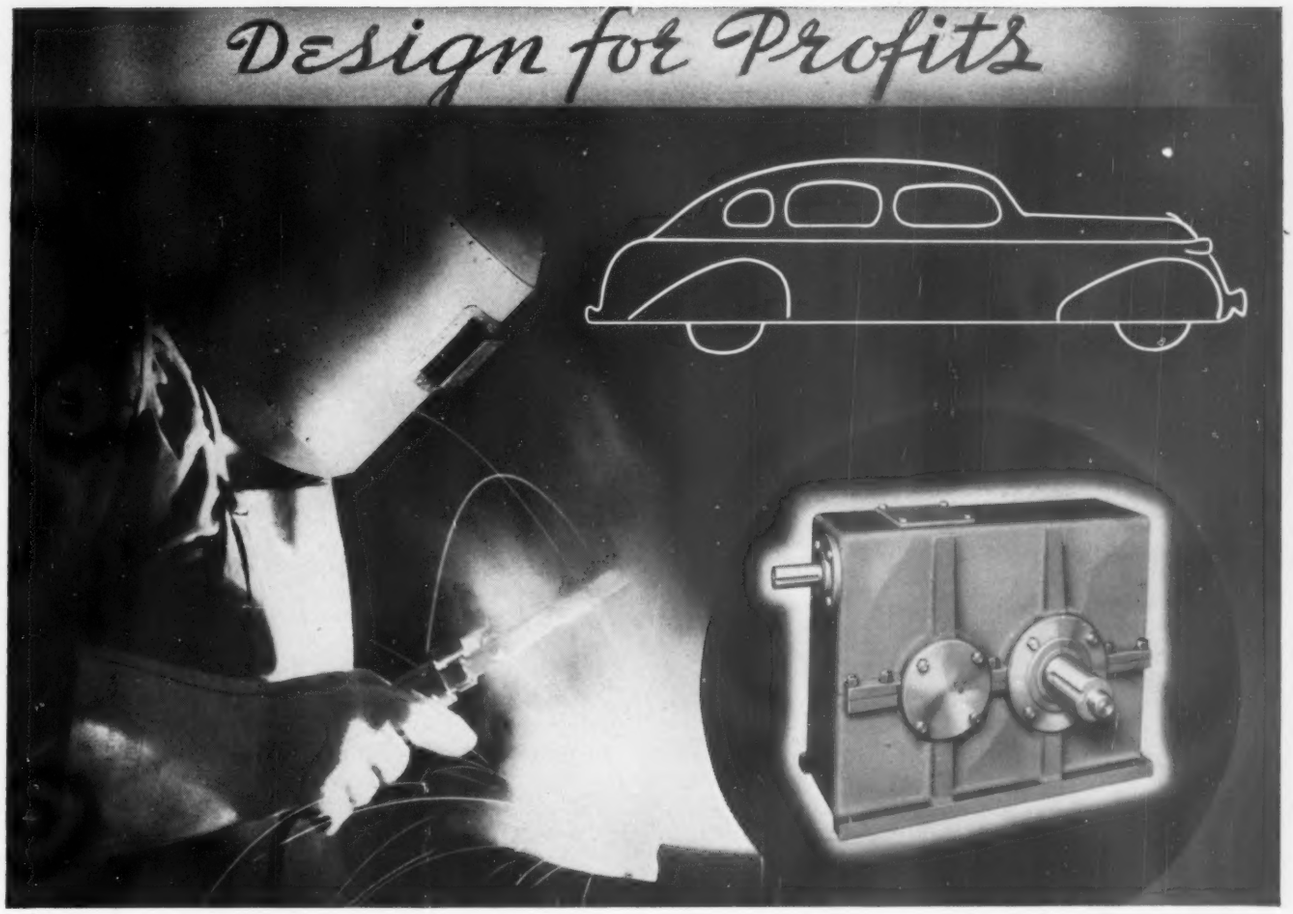
In conclusion, he states that particular attention also has been directed to the stress analysis of welded joints and structures in an effort to assist the designer in production of more satisfactory welded structures. Improvement in the theory and practice of designing welded joints is a long needed factor in welded construction and should aid greatly in extending the use of arc welding for fabrication purposes.

COMFORT A. ADAMS, consulting engineer, Harvard university, Cambridge, Mass., indicates that there are two subjects in the welding field in which more accurate and quantitative scientific investigation is seriously needed. One is in connection with spot welding, and the other has to do with residual welding stresses and their influence upon the serviceability of the resulting welded structures.

The year just closed has seen actual preparation for a sound prosperity in which low manufacturing costs—and then higher profits and certainly greater volume of sales—are being made possible by extended and more intelligent application of welding. This is the opinion of O. A. Tilton, electric welding engineer industrial department, General Electric Co., Schenectady, N. Y., who goes on to say that the depression has forced a search for other, more economic ways of doing things.

In the early years of reduced business activity,

INTERESTING development of the year was this automatic welding machine. Fifty electrodes are loaded into a magazine and fed into welding position as required. Work table is synchronized with the feed of welding rods



"Eye Appeal" Helps Sell Machinery, Too

WHEN performance curves and engineering data have had their say, *style* steps into the sales negotiations for today's industrial machines. Smooth-surfaced, stream-lined—these machines, large and small, must *look modern* to proclaim the fact that they *are modern.* By capturing the eye, they go a long way toward capturing the order.

The key to good looks in machinery, as it is in automobiles and many other metal products of today, is *welded construction.* That is how the speed reducer, shown above, was built. And a pleasing appearance is not its only asset. It was fabricated from standard steel parts by means of *"Shield-Arc"* welding, saving $150.00 in manufacturing costs, saving 11% in weight, providing maximum strength for limited mounting dimensions. Hence, welded construction can be a key to *many* outstanding benefits.

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industry began to consider seriously, almost for the first time, those economic opportunities offered by use of welding. As a result, there followed a period of transition. Now, however, things seem to have settled down. Where the pendulum had swung too far, it has been reset to a saner amplitude; where it had not been given sufficient impetus, the required additional forces have been applied.

Examples of stabilized welding practice cited by Mr. Tilton are:

1. A realization that machine welding is an economy over hand welding only when a proper balance results between labor and material cost and investment.
2. High welding speeds must be balanced against quality of weld material.
3. High welding currents and large-sized electrodes often accomplish nothing but increased power and material consumption and frequently impair quality.
4. Chief advantage in use of alternating current for welding is practical elimination of magnetic blow rather than a differential in first cost that sometimes exists in the welding units themselves.
5. There are still many entirely proper applications for bare or lightly coated electrodes. Heavily coated electrode can frequently justify its greater cost by providing a necessary improvement in quality as well as increased welding speed but this is by no means universal.
6. Each welding process has its distinct advantages. Many of these processes overlap as to possibility but usually not as to economy of application.

Of these, concludes Mr. Tilton, perhaps the most important in 1936 was realization that high welding currents and large-sized electrodes are generally not an economy. Perhaps a peak has been reached in these factors, which will not be exceeded until new welding processes not now known are brought forth.

James W. Owens, director of welding, Fairbanks, Morse & Co., Beloit, Wis., views as an important development of 1936 the demand on manufacturers of mobile land and marine structures and machinery manufacturers to eliminate deadweight to obtain higher speeds, greater pay loads and lower operating costs. As a result, was witnessed belated recognition by producers and users of steel of the part that welding, flame cutting and allied thermal processes can play in increased sales of their products.

Experienced designers and competent welding operators are our greatest need, declares Mr. Owens. The former is being met by lecture courses and the latter by training courses. Present base and filler materials and types of equipment can take care of technical and economic requirements. However, decided improvements in all of these have been noted during the year.

It is expected, Mr. Owens says, that improvements in present symbols for showing welds on drawings, based on experience of designing engineers with use of these symbols, will shortly be approved by the American Welding society. These improved symbols should materially facilitate design of welded products.

OXYACETYLENE torch is proving a valuable tool in the cutting and shaping of steel for a variety of uses. Both hand and machine operated torches are broadening fields of usefulness

APPRAISING the current status of the oxyacetylene process, engineers of Linde Air Products Co., New York, state that new applications for welding and cutting are developing rapidly and the previously established operations are constantly undergoing refinements which lend further value their industrial uses.

As a fundamental process, the oxyacetylene flame made itself more important in 1936, several factors being responsible. Among these are continued recognition by regulatory bodies; metallurgical study and acceptance of welding and cutting; study of welded design; a new recognition of responsibilities in safe and proper handling of equipment; realization of the necessity for adequate training and qualification of operators; and improved apparatus.

According to Linde engineers, latest revisions in boiler repair rules define the extent to which fusion welding can be used in repair of steam boilers. A series of tests to determine shearing strength of steel anchor clips bronze welded to cast iron pipe opened the way toward much wider use of bronze welding by gas and water companies. Preparation of specifications for construction and repair of bridges is another step in the use of welding in the structural field. Of particular interest in these specifications is the definite attitude favoring the butt type of weld.

Decided progress has been made in welding alloy material; today correct techniques can be recommended for satisfactory welds. Oxyacetylene welding of industrial piping has progressed in several directions and the year has been one of great activity in overland pipe line construction. It is pointed out that among the most valuable advances in equipment are those in the field of machine cutting; steel parts

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HITHERTO closed to alloys, the malleable iron industry has begun commercial production of new special metals to meet specific service needs, reports W. J. Priestly, vice president, Electro Metallurgical Co., New York. Tensile strengths ranging from 75,000 to 125,000 pounds per square inch and elongations of 3 to 15 per cent are being obtained in pearlitic malleables, or semimalleables, containing chromium, nickel, copper, molybdenum and vanadium. Although little has been published on these castings, their tonnages are increasing rapidly.

In the field of cast iron and steel, the problems of producing castings to meet severe wear, high temperature and corrosion have been largely overcome by a combination of close technical control with a better knowledge of the properties and correct applications of alloyed castings.

Production of new and improved cast irons has been made possible by the use of more efficient melting methods and closer control. One of the recent advances in melting has been the use of higher blast pressures in cupolas. There also has been a further tendency toward duplexing. Closer control of cupola iron is obtained through the chill test which formerly was used in only a few foundries. There is a better understanding of the influence of the materials in the cupola charge, says Mr. Priestley; as a result, such properties as tensile strength, transverse bend, density and enameling properties of cast iron are improved.

Among alloy compositions that have come into wide use during the year is one containing 1 per cent chromium and 2.4 silicon. It is used for stove parts, stoker links and other castings for service up to 1400 degrees Fahr. Sometimes the chromium is pushed up to 2 per cent in this mixture. For temperatures up to 2000 degrees Fahr., low-carbon steels containing 15, 24, 28 or 34 per cent chromium are coming into wide use. Good results have been obtained with billet heating furnace skid rails cast from a 31 to 34 per cent chromium composition and not equipped with a circulating cooling system.

Chromium now is being used in cast iron pipe of all sizes, to control the structure and to increase corrosion resistance. A demand for longer wearing castings has been met by the use of alloys. A substantial proportion of the automotive cylinder block production during the year contained chromium, nickel, copper or molybdenum. Another advance in which automotive companies have been active is in the use of nitrided cast iron parts.

In the field of steel castings, states Mr. Priestley, new and better alloy combinations have been developed and methods have been improved. In open hearth and electric furnace shops there is better slag control and a better understanding of the insulation of furnaces and of temperature control. There is a better understanding of the chemical composition of the melt. As a result, castings of much higher quality are being produced. Alloy steels that have high abrasion resistance, impact resistance and other desirable

properties have been developed and widely accepted. Another important forward step in the steel casting industry is the increased use of the centrifugal method of casting highly alloyed tubing.

IRON foundries made more extensive use of insulated ladles to conserve heat and prevent excessive drop in the temperature of the metal, says Victor A. Crosby, Climax Molybdenum Co., Detroit. Preheating and desulphurizing forehearths were employed more widely. Large reservoirs, gas fired or electrically heated, were used more extensively. These trends result in castings with greater chemical and physical uniformity.

Foundrymen are realizing, says Mr. Crosby, that there are certain definite limitations with the cupola as a melting unit when operated intermittently, with the result that higher quality castings may be expected in the future. He believes that the low-carbon cast irons, containing 1.50 to 1.70 per cent carbon, definitely have proved their usefulness and will be more widely used in the future, for the reason that they have high physicals and good machinability after heat treatment. A chief obstacle to progress with the harder gray irons of high physicals is a failure in some quarters to realize that equipment and tools for machining these special irons are available. In some instances high strength cast irons are annealed for machinability and hardened for serviceability. A machining operation on the casting in the as-cast condition thus would eliminate three heating operations. Use of amorphous graphite as a ladle addition to eliminate chilled edges and to increase machinability has become general.

During the year there was a distinct tendency to demand still greater strength in alloyed high strength irons and as a result a percentage of molybdenum has been incorporated with the alloying element previously used. This has been the case with heat treated cast iron forging dies. Use of alloying elements in automotive cast irons is increasing even though, with a few exceptions, the amount is small. There is a tendency to alloy blocks, heads and pistons sufficiently to eliminate free ferrite. This tendency also is reflected in large cast diesel and truck blocks where maximum wear resistance is obtained through the inherent wear resistance of properties of the alloying elements used. Molybdenum in combination with other alloying elements received wide recognition in this respect during 1936. Mr. Crosby's concluding comment is that irons of high hardness and maximum strength, with low chilling tendencies, seem to be the goals desired and to meet these requirements the proper melting units, together with the correct basic metallic mixture and the right alloying elements must be selected.

EXPANSION in the use of alloys by the gray iron industry also is stressed by Oliver Smalley, president, Meehanite Metal Corp., Pittsburgh. There is a better understanding as to how to get such engineering properties as resistance to fatigue, torsion, impact, creep and others. Heat treatment of cast iron is receiving wide attention. Flame hardening has been applied rather widely in local hardening of dies and press tools, gear wheels, cams, machine tool guides, drilling heads and many other parts. Obsolescence in plant and personnel which resulted from the prolonged depression, says Mr. Smalley, received active attention by foundrymen during 1936.

Speaking of the increased use of alloy additions in both malleable and gray iron foundries during 1936, Enrique Touceda, Albany, N. Y., points out that such additions to the hard iron for malleablizing have been aimed at securing a yield point in the neighborhood of 42,000 pounds per square inch or more without effecting adversely either ductility or machinability. In gray iron foundries there has been a tendency to make special products through a subsequent heat treatment of the casting alone or through the addition of alloy metals with or without a subsequent heat treatment of the castings, the object being greater strength and greater resistance to wear, heat and corrosion. Dr. Touceda points out that the balanced blast cupola, originated in England and used extensively there and in continental Europe for some years, is an innovation in this country and that it is producing a substantial saving in fuel in the few cases where installations have been made. The rotary furnace is being used at a few plants for gray iron production. Rather drastic steps have been taken to eliminate dust from foundry atmospheres.

Silicosis problem has been given more earnest attention and most large foundries are taking additional steps to protect their men, says R. S. MacPherran, chemist and metallurgist, Allis-Chalmers Mfg. Co., Milwaukee. He also reports a decided increase in specifications for alloy and heat treated castings, as well as a decided growth in the demand for high-test irons. He comments on the fact that special pig irons, to facilitate the making of special castings, now are available.

DESIGN of furnaces for annealing malleable castings appears to be tending toward units in which the castings can be heat treated in units of high diffusivity and without the need of aggregation into large sub-units as in annealing pots, says H. A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland. Earlier attempts to accomplish this in intermittent gas tight electrically heated furnaces had been handicapped by cost considerations, he says, adding that one continuous radiant tube furnace now in operation and other radiant tube furnaces planned may overcome the handicaps of uniformity of temperature without adding prohibitively either to the investment per net ton of long production or to the operating cost. It is yet too soon, says Mr. Schwartz, to declare whether this hope can be realized but he feels, at least, that an intelligent approach to the problem has been made.

Co-operation between the foundry and the weldery has developed a new technique of combining structural steel and steel castings, with added advantages to the designer of machinery and engineering construction, says F. A. Lorenz Jr., vice president, American Steel Foundries, Chicago. Developments in the transportation field, the largest user of steel castings, says Mr. Lorenz, have called for increasing numbers of alloy castings to provide greater strength with lighter sections. In general, it has been necessary to furnish castings to closer dimensions, cleaner and to more rigid specifications than ever before. Developments in analysis, heat treatment and design of steel castings have necessitated improved practices and the

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Better Machines Push Field for Die Castings

IN THE field of zinc alloy die castings, says R. Davison, New Jersey Zinc Co., New York, the outstanding factor during 1936 was the amazing growth in the number of applications. Many of of these new applications have been made possible by improved die casting machines. For instance, large new machines permit the die casting of automobile radiator grilles with overall dimensions around 34 x 17 inches and 6½ inches deep. Too, newly perfected die casting machines are faster and more automatic, thus permitting economical production of an ever increasing number of new die castings. One of the interesting die castings developed last year was a lens holder for a surgical instrument; although of complicated design this casting weighs only 4 grams and had wall thickness of 0.023-inch.

Of importance is the development of a dichromate dip process which produces a protective coating on zinc alloy castings. It reduces materially the corrosion rate and prevents formation of white corrosion products. This treatment, says Mr. Davison, paves the way to many applications involving extreme exposure.

Mr. Davison reports an expansion in the number of applications in all the major industries which have been using die castings extensively, these including the automotive, electrical, small machine, household appliance, business machine, hardware, toy and novelty fields. In 1936 the radio industry joined the ranks of the major users of zinc alloy die castings.

HIGHER speed die casting machines and thinner wall stock have placed zinc die castings in a more favorable position to compete with other methods of manufacture, says Charles Pack, vice president, Doehler Die Casting Co., New York. Progress in die casting brass and other copper base alloys has been made and the use of such castings has increased largely; much remains to be accomplished in the brass die casting industry, however, says Mr. Pack. He states that magnesium die castings have become a definite factor in the die casting industry during the past year. Progress in the die casting industry generally, he says, has been in many directions, all tending to increase the area of industrial applications of such castings. As an outstanding example of a die casting well beyond the known die casting technique in 1935, he cites a die cast radiator grille containing more than 1200 ⅝-inch square holes.

The larger, heavier and faster die casting machines developed in 1936 also are regarded by D. L. Colwell, Stewart Die Casting Corp., Chicago, as having contributed heavily to progress in the die casting industry. Of equal importance is the advance in maintaining temperature control. Improvements in zinc alloys and their standardization by the American Society of Testing Materials has increased the necessity for accurate control of materials and producers with accurate control have been able to take advantage of the guarantee implied by such specifications. Mr. Colwell reports that where lightness or higher melting point are required aluminum continues to be used, with magnesium gaining increasing recognition where extreme lightness is needed.

BRASS pressure die castings gained greatly in demand in 1936, says W. W. Sieg, general manager, Titan Metal Mfg. Co., Bellefonte, Pa. He reports that production has been facilitated particularly by the development of new die casting machines by Reed-Prentice Corp., Worcester, Mass., and Madison-Kipp Co., Madison, Wis. While the machines now available will produce the castings wanted, says Mr. Sieg, the life of the steel dies is not what it should be. The industry loses many orders because short die life moves up the selling price. The industry needs better die steel, says Mr. Sieg, to safeguard its economic position.

Expansion in demand for aluminum die castings is reported by E. H. Dix Jr., chief metallurgist, Aluminum Research Laboratories, Aluminum Co. of America, New Kensington, Pa., who estimates that aluminum die castings produced in 1936 had a sales value of about $7,500,000. Of this total a substantial portion went into castings and eclipsed all previous records. An instrument manufacturer, for example, uses a die cast base 20 inches long, 19 inches wide and 12 inches deep, cast in a die 4 feet long and 30 inches square. The die is further complicated by a number of undercuts so that several loose cores must be employed; its size necessitates the use of two gates to insure complete filling. Another large aluminum die casting is a washing machine wringer frame with overall dimensions about 7½ x 11 x 22 inches.

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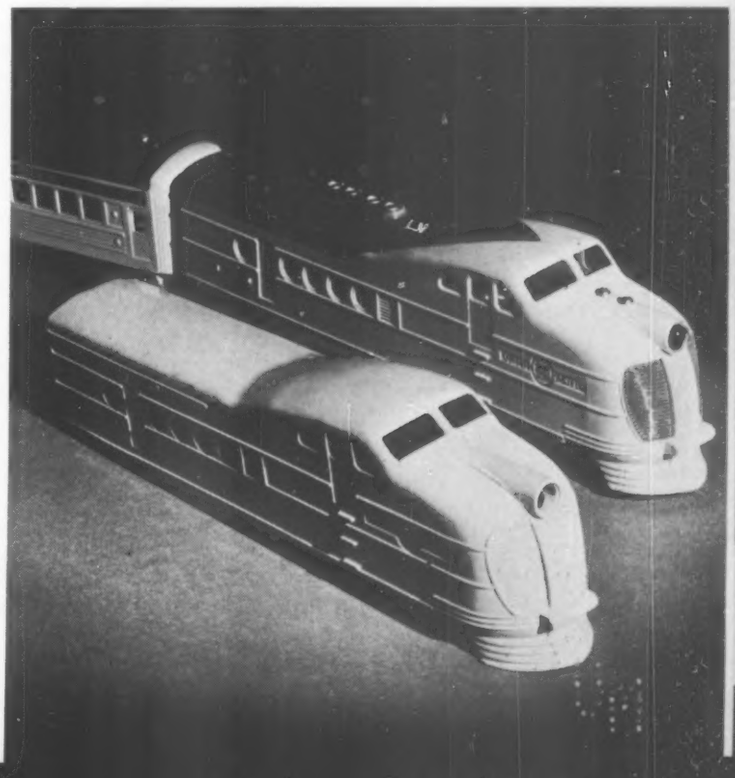
APPLICATIONS such as this realistic toy locomotive are typical of the sales appeal that zinc alloy die castings can provide for metal toys. New Jersey Zinc Co. photo



STEELMAKING PROGRESS

DESIGN and construction of hot and cold strip mills continued actively in 1936, states John Liston, General Electric Co., Schenectady, N. Y., in appraising developments in steel production. One hot mill placed in service is capable of producing strip up to 93 inches wide and with a delivery speed up to 2000 feet per minute. Cold strip mill drives, Mr. Liston points out, have been growing in capacity as the rolling speeds were raised higher and higher. Tension control between the stands of cold strip mills is being recognized more and more as extremely useful equipment. Three mills now under construction are being equipped with such tensiometers.

Electrical equipment for skin-pass rolling of cold strip, after annealing, is becoming more complicated, he observes. The main rolls, the feed reel, and the winding reel still require separate electric drives. In addition to this, a so-called "puller," consisting of pinch rolls, is located between the mill and either reel. Each puller is driven separately, and automatic strip tension control is applied to four out of five driving motors.

Steel-mill operations, Mr. Liston states in conclusion, are more and more controlled by instruments and indicators rather than by the operator's judgment. The latest addition to this system of controls is the strip-mill tension regulator for measuring, and so controlling, the tension in strip rolling.

The amazing increase in the number of wide strip and continuous mills, comments J. L. Cox, chief engineer, Mid-

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vale Co., Philadelphia, has created a demand for hardened and ground steel rolls that is being met by greatly increased equipment for their production, especially in the number of larger roll grinders recently installed and building. This demand naturally will decline to a lower level when the initial equipment of the new mills has been delivered and replacements, only, form the market.

In 25 years, notes W. H. Burr, superintendent, electrical and mechanical departments, Lukens Steel Co., Coatesville, Pa., the automotive industry has developed to such an extent that today its needs determine the trends on the steel industry.

The building program of the steel industry for the last three years has been devoted almost entirely to the production of flat rolled material.

Refinements, which designers of steel mill equipment have developed, are almost beyond human conception. The modern differential cooling tables located between the roughing and finishing stands are said to aid materially in maintaining extreme accuracy of gage.

UNDOUBTEDLY the improvement in the efficiency of open-hearth insulation has been of tremendous value to the steelmaker, comments W. J. Reagan, open-hearth department, Edgewater Steel Co., Pittsburgh. As a rule the application of insulation usually is accompanied by the installation of roof temperature control devices, atmospheric control instruments, etc.

Fuel consumption is reduced and refractory life increased and often steel is produced with less than 4,000,000 B.t.u. per ton of steel. While it is difficult to find any outstanding change in open-hearth operation or construction, Mr. Reagan is of the opinion that during the next few years the use of insulation material on the open-hearth furnace eventually will produce radical changes in design and operation.

Steel producers are approaching that point on the circumference of steel plant improvement or expansion cycle at which the governing personnel are of necessity forced to take stock of that often neglected department, the open hearth, states W. C. Buell Jr., engineer, Cleveland.

The large increase in flat finishing capacity installed during the past few years coupled with the 79½ per cent ingot capacity operating rate, which was achieved the week of Dec. 19, is taxing the ingot-making capacity as never before. It appears doubtful that a sustained rate above, say, 75 per cent could be maintained over other than a comparatively short period, due to the obsolescence of a large portion of the basic open-hearth furnaces that are carried on the books as components of the ingot producing equipment of the country.

The foregoing statement is supported by the following tabulation of Mr. Buell's showing the periods during which the ingot producing capacity of the country was constructed. Of the 970 odd furnaces that now constitute the ingot producing capacity:

No. of furnaces	Originally built
132	1886 through 1899
318	1900 through 1909
318	1910 through 1919
92	1920 through 1930
60-65	since 1930

With but few exceptions, only those furnaces built since 1928 or 1929 approach the present-day standard and designation of modern equipment, and many of the older furnaces must in the near future be relegated to the plant dump.

At present, Mr. Buell points out, ingot production is indirectly receiving much attention by operators as is witnessed by the increased activity in soaking pit equipment. Many new pits recently have been installed and enough *bona fide* bids or appropriate estimates have been asked to bring the total of the plants interested in additions of this type of equipment to more than 30.

This is concrete evidence of a demand for supplementary tonnage and of the fact that lack of sufficient present soaking pit capacity is the "bottle neck" now throttling greater steel production from present equipment (see page 109).

The ten or 12 open-hearth furnaces built during 1936 have no particularly new or startling innovations. Those constructed by Inland Steel Co. show a high order of detailed design. Experiments continue spasmodically with the small recuperative and roof-fired furnaces in the East, and progress, if any, along these lines is slow.

In general, states Mr. Buell, the industry is bettering its fuel rate, and in the more progressive plants fuel rates down to 3,500,000 B.t.u. overall are being talked of as reasonably possible of accomplishment in the near future. As in the past, many operators seem to think the fuel rate to be the best general indication of their practice. Several students of the practice are in total disagreement with this idea.

Natural gas, Mr. Buell states in conclusion has been piped into the Chicago district during the past year and is available to several steel plants in that district at the interesting price of 19 cents per thousand feet. Thus operators around Chicago are trying to "relearn" the practice those in the Pittsburgh district had to "unlearn" 20 years ago.

FORSTERITE brick continues to give satisfactory service in rotary kilns, copper furnace roofs and in certain open-hearth bulkheads, points out F. A. Harvey, director of research, Harbison-Walker Refractories Co., Pittsburgh. Many experiments have been made during the year just closed with exceptionally high burning temperatures for this type brick, and while it is too early to predict the results definitely, he is of the opinion that a field for the higher fired product exists. The use of superduty fireclay brick has been extended phenomenally. Mr. Harvey points out this type brick is proving its worth in many types of service including rotary and shaft kilns, heating furnaces, boilers, soaking pits, glass tanks, checkers for open hearths and blast furnace stoves, and for water-gas sets.

Substitution of low-thermal conductivity basic brick for silica in open-hearth furnace endwalls, downtakes, front and backwalls continues, according to observations of R. P. Heuer, director of research, General Refractories Co., Philadelphia. No particular new types of basic brick were introduced but improvement in quality was general.

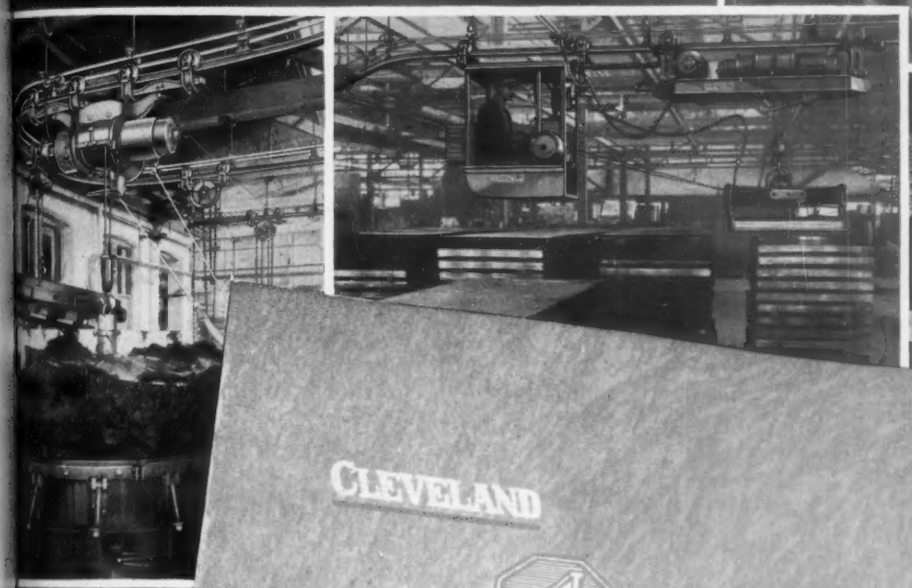
Many new basic open-hearth bottoms, he asserts, were put in using magnesite exclusively for that part of the bottom and banks which must be in contact with metal and slag. The magnesite materials for these parts of the bottom were chosen on the

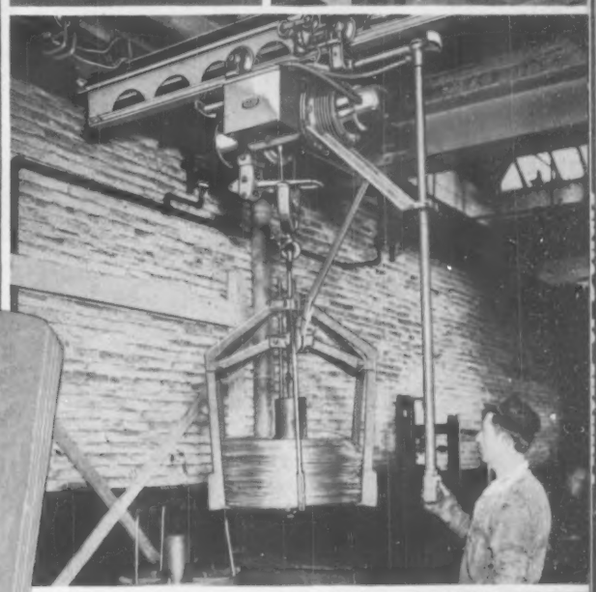
(*Please turn to Page* 424)

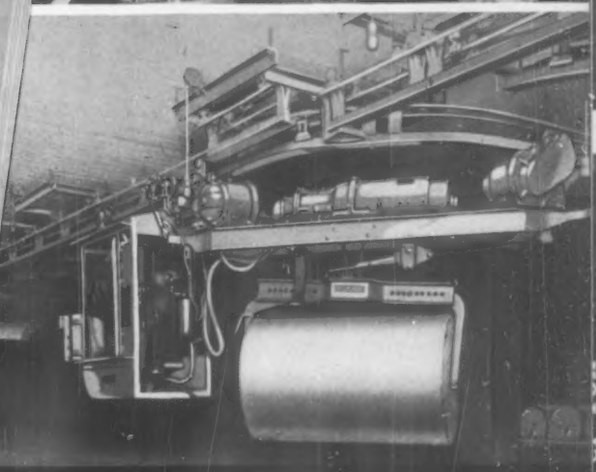
HANDLING EQUIPMENT

CLEVELAND TRAMRAIL

The most complete system for the overhead handling of material or product from car or truck to and through the manufacturing processes. For light service - for heavy service.







Likewise the design of the thousands of materials handling Units and the miles of rail and arch beam which carry the name plate of Cleveland Tramrail is outstanding in its contribution and leadership in the field of "materials handling"—bringing this necessary adjunct to modern manufacturing processes from the realm of home made inefficient units to the high degree of complete "Cleveland Tramrail Systems."

A bound group of folders giving the Reason Why of Cleveland Tramrail is yours for the asking.

CLEVELAND TRAMRAIL

DIVISION OF

THE CLEVELAND CRANE & ENGINEERING CO

1125 Depot Street

WICKLIFFE, OHIO

RAW MATERIALS

PROVISION by the steel industry for raw materials to meet the growing production now assured for early 1937 and for a continuance or increase in later months is ample. In iron ore, coke, scrap and ferroalloys existing channels are sufficient to provide for as large an ingot production as in 1929, and without difficulty they could be expanded to meet needs for a considerably larger steel tonnage.

The only raw material in which the possibility of pinch is present is coke, but it is believed sufficient beehive ovens could be revived and put into service to provide the heavier needs resulting from larger pig iron production.

Scrap supplies always are sufficient to meet requirements, at a price; iron ore needs only sufficient lake ships to transport any tonnage needed for making iron. Idle fleets are ready to meet this need. In ferroalloys producers can easily increase their tonnage and cover any demand likely to arise.

Thus the industry enters 1937 with every prospect of encountering no drawbacks in obtaining sufficient raw materials for any probable eventuality, no bottlenecks being apparent to restrain full speed ahead as far as demand for the finished products may carry steelmaking.

Importance of scrap as a raw material in the steel industry has been gaining increasing recognition in the past few years and now it is probably second only to iron ore, which it displaces to a considerable degree. In fact, the tonnage of scrap consumed in steelmaking in 1935 came close to that of iron ore. In that year, according to a survey by the bureau of mines, steelworks used over 26,000,000 tons of scrap and for the same year 28,362,368 tons of iron ore were brought down the Great Lakes, according to the Lake Superior Iron Ore association.

These two figures are not directly comparable because the ore tonnage is not an exact measure of consumption, a reserve in yards and on dock varying at the beginning and close of the season of navigation. However, it gives an indication of the importance of scrap relative to iron ore.

While integrated steel companies can assure themselves of coke supplies by building their own coke ovens, and of ore by ownership of mines and steamships for its transportation, they must rely on the organized scrap industry for their supplies. This is because scrap is not manufactured, but simply happens as an incident in the fabrication of ultimate steel products or of obsolescence and replacements.

But, in spite of the fact that no definite and perma-

A NEW HIGH MARK

for Silica Brick

	PIONEER	Best Previous
PLANT *no* **1**	— 422 heats	269 heats
PLANT *no* **2**	— 378 heats	330 heats
PLANT *no* **3**	— 407 heats	263 heats
PLANT *no* **4**	— 396 heats	289 heats

PIONEER is a new super silica brick, competitively priced, which has a P C E value of 34-plus.

Its success is built on the truly amazing refractory qualities of TITANITE QUARTZ, one of nature's hardest, most highly heat-resistant, products. Many years and $150,000 spent in experiment and research taught us how to use it. Ten solid years of actual use in industry have proved it. Now — you can cash in on TITANITE QUARTZ, found only in PIONEER.

Proof? Floods of it! Not claims; not tests; just actual records of performance in the tough spots.

Put PIONEER in the toughest high-temperature silica brick spot — where a very high softening point is essential—where spalling costs you money — where abrasion is serious — anywhere that premature silica brick failure has dogged you.

In every case where this has been done, PIONEER has permanently won a place for itself with a minimum saving of 11% And a brick that lasts 11% longer (or more) also saves you 11% (or more) of your patching and relining costs Reduces the time your furnace is down for repairs, too

You'll want all the facts on this revolutionary new silica brick. Write NOW for detailed records of performance, and for the news of its amazing new super base, Titanite Quartz...

PIONEER Beat ALL DEMANDS that makes

★ TITANITE QUARTZ

Untold centuries ago, during the Pleistocene Age, the great glacier which moved down from the polar ice cap to the northern part of the United States carried many Canadian quartz formations down with it, and deposited them in huge quantities when it receded. Such a deposit was discovered near Portsmouth, Ohio. Obviously of Canadian igneous origin, fusion of this mineral by tremendous volcanic heat, and compression under weight beyond man's imagination, are the cause of its extreme hardness. Centuries of grinding movement in the ice sheet, and of water flushing before and after ice-movement ceased, cleansed and refined the mineral until it was practically free from iron and other impurities. It is called Titanite Quartz to express its amazing strength and lasting qualities as a refractory when properly mined, formed, bonded and fired. Titanite Quartz comes only from the Titanite Mines and Quarries and is to be found only in PIONEER super silica brick, which is composed 100% of this mineral.

A CLAY BRICK For Every Need

You pay no more (maybe less) for Portsmouth Refractories clay brick, and among the five brands offered you will find one which, for your particular use, pushes performance to the maximum and yearly cost to the minimum. Tell us your clay problem. We'll put 55 years of experience to work on it.

EGYPT Kentucky Quality Clay Brick is made of the finest of high fusion Kentucky quality clay, scientifically blended and precisely burned to give long life. Unusually high softening and fusion points . . . low porosity . . . less spalling . . . high salvage value

PORTSMOUTH Kentucky Quality, another high quality refractory, resists spalling, warping and bellying . . . cuts maintenance costs

P R C O Ohio Quality, leads the field in solid, substantial service among clay bricks selling at medium prices, and matches many that command higher prices.

SAVAGE Ohio Quality is the favorite of many who demand above-average service and freedom from trouble, at a lower price. Excellent for cupola and like practices.

SERVICE Ohio Quality brings metal men down to the lowest possible level without sacrificing essential service features.

GROUND CLAY carefully selected, quarried and processed, its complete uniformity and satisfactory performance removes a constant source of worry from the minds of its users.

Geared and Located to Serve YOU Quickly!

SPECIAL SHAPES—With our own machine shop, pattern shop and foundry within our own works, we are in a position to handle orders for non-standard shapes with unusual speed. Complete control also insures precision in the finished product.

SPECIAL SERVICE—A rush order for standard shapes is, immediately on receipt, placed in the hands of one man whose duty it is to see that it is immediately loaded and shipped. No red tape, no delays, no alibis. Patterns and molds for special shapes are handled just as simply and efficiently. Our own railroad sidings connect with all lines entering Portsmouth and Hitchcock, Ohio. Both towns are blessed with unusual railroad facilities and with numerous river and truck lines, enabling us to reach any plant quickly and at low cost to you.

PLEASE NOTE—Since special kilns are necessary to resist the terrific heat essential in firing PIONEER super silica brick, we are forced to reserve the right to give preference, if necessary, to those who first adopt this brick until production facilities can be increased without jeopardizing quality. However, we hope to be able to fill all orders promptly. No orders will be delayed without immediate notification.

The PORTSMOUTH REFRACTORIES Co.

PORTSMOUTH, OHIO

nent sources of scrap can be made a part of its preparedness the steel industry never lacks for ample supplies, provided the price is raised sufficiently to attract shipments from a wider area.

Another factor in the scrap situation is the automatic play of price influence as between pig iron and scrap for the open hearth. When prices must be raised sufficiently to attract scrap from wider areas and thus increase the cost to the steelmaker beyond an economic level he reduces the scrap content of his charge and uses a greater proportion of pig iron, thus lessening demand for scrap and correcting the price situation.

There are two general divisions of scrap before separation into the many grades recognized by the industry. These are the socalled home scrap, which consists of crop ends and other items discarded in the process of converting ingots into merchantable products, and purchased scrap, bought in the market.

Steel ingots lose almost one-third their original weight in being processed into forms which can be sold and the aggregate of the scrap thus produced constitutes practically half that used in open hearths. In 1935, a bureau of mines survey shows, home scrap totaled 13,346,752 gross tons and purchased scrap 13,068,578 gross tons. It is the latter figure which represents the extent of the real scrap industry, which serves the steelmakers by gathering, preparing and supplying tonnage needed for whatever output of steel the situation demands.

During the same period that these 26,415,330 gross tons of scrap were being melted a total of 20,505,137 tons of pig iron were employed with the scrap in production of 33,417,985 tons of steel ingots and various classes of steel and iron castings.

Basing on an estimated production of steel ingots in 1936 as 47,800,000 gross tons, scrap consumption has been close to 37,000,000 tons, of which somewhat in excess of 18,000,000 tons was home scrap and about the same tonnage purchased. This compares with 44,822,023 tons of iron ore moved from the head of the lakes.

In addition to the automatic check on prices afforded by ability to vary the proportion of pig iron and scrap in steelmaking processes the supply of scrap is automatically increased as steel production rises. The proportion of home scrap is relatively steady and as soon as a larger tonnage of steel products enters the cycle of conversion into products for sale an enlarged stream of scrap starts flowing back toward the centers of steel production. As the output of automobiles grows the tonnage of sheet scrap increases; as more freight cars are repaired more used parts find their way into the scrap current and as steel in all its forms is fashioned into a thousand ultimate forms scrap results, and in exact proportion to the enlarged output of steel.

The uncertain factor is in the tonnage of scrap gathered from obsolete buildings, machinery, vehicles, bridges and practically all forms into which steel is fabricated. This, too, is related to the output of new steel, inasmuch as practically all the outmoded steel necessarily is replaced by new. Thus there is a virtual certainty that scrap supply always will be sufficient.

In recent years a new factor has come into the scrap market and has had some influence on prices and tonnage. This is the demand that has arisen for export to Europe and Asia. In 1935 total exports of this sort were 3,067,336 gross tons and in 1936, on two months estimated, it is close to 3,000,000 tons.

A saving factor in this situation is that practically all the exported scrap moves from districts remote from steelmaking centers and thus interferes only slightly with established supply channels. At the same time export scrap has been draining away accumulations in remote sections a new source has been developed in the region of the Great Lakes. Cheap water transport has made it possible to carry heavy tonnages of scrap from the head of the lakes and from Milwaukee, as well as from the automotive industry at Detroit, to Buffalo and Cleveland.

During the season of navigation in 1936 it is estimated 300,000 tons were shipped by lake from Duluth and Superior, 100,000 tons from Milwaukee and Chicago and 100,000 tons from Detroit. So important has this traffic become that Marine Iron & Shipbuilding Co., Duluth, is preparing a fleet of lake vessels to operate in the scrap trade in 1937.

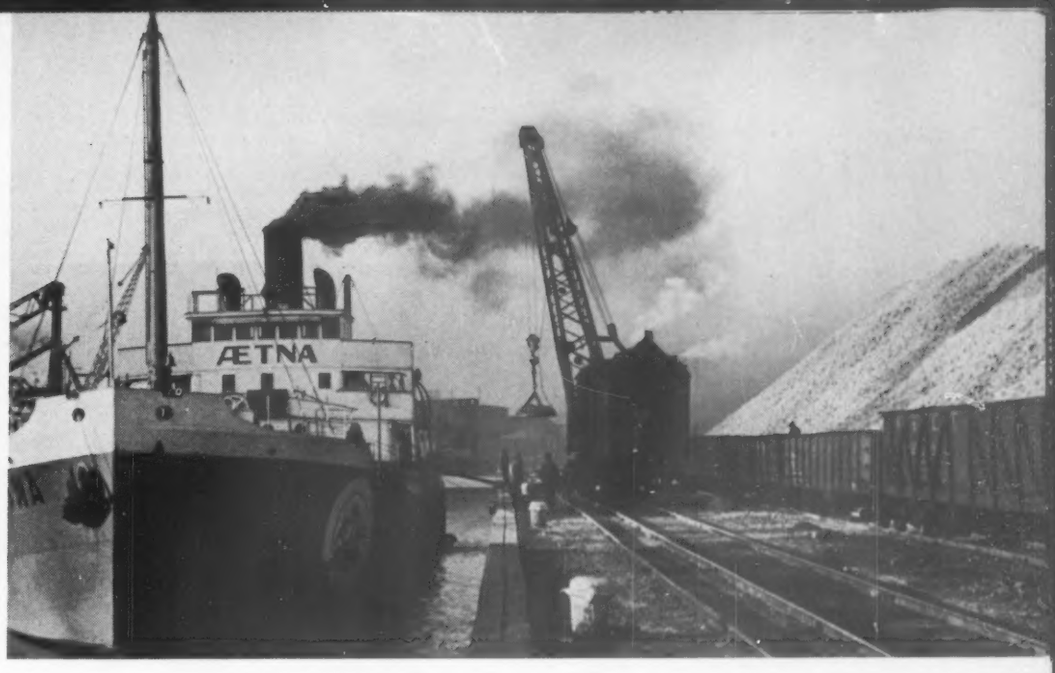
EXPECTATIONS of increased activity in iron ore in 1936 were fully realized and Lake Superior ore shipments attained the highest tonnage since 1930. The gain over 1935 is 58.03 per cent. The increase in 1935 over 1934 was 27.4 per cent.

Increased movement of Lake Superior ore to lower lake ports was in sufficient volume to provide a reserve at furnaces and on docks considered ample to sustain steelmaking operations until May 1 at the high rate now prevailing. With about 35,000,000 tons in reserve and consumption slightly over 4,000,000 tons per month the five winter months would require somewhat over 20,000,000 tons to tide over until spring.

Normally in predepression years it was considered safe to figure on an excess of about 19,000,000 tons left in reserves at the end of winter, when fresh supplies began to arrive at lower lake ports. In 1929 this figure was scaled somewhat and reserves were drawn down to 16,000,000 tons.

A smaller reserve tonnage seems safe under present conditions, due to the smaller number of pig iron producers and as a result a lessened number of furnace stockpiles. The tendency for many years has been toward a smaller number of blast furnace operations and this has concentrated furnace reserves sufficiently to require a smaller total to assure uninterrupted production through the winter.

With a total of 44,822,023 tons of Lake Superior iron ore moved to lower lakes the upward movement from the low of 3,567,985 tons in 1932 showed increased acceleration over 1934 and 1935.



DOWN the Great Lakes is floated a tremendous cargo of iron ore and limestone to provide raw material for steadily mounting blast furnace needs. Surveys show these supplies to be ample for 1937

This condition allowed ore producers opportunity to improve the condition of their mines and stockpiles, which had not been possible during the preceding years of low production and shipments. It has been possible to put stocks at mines in better condition and clear up inequalities resulting from forced operation in slow years, when mining companies carried on production in absence of demand, in order to give employment to as great a degree as possible to their key employes, to maintain a skeleton organization.

Sudden onset of freezing weather at the head of the lakes and at the Soo cut the season short practically at the beginning of December and prevented carriage of some 500,000 tons of ore that was ready to move during the first few days of that month. This additional tonnage would have brought the season's total well above 45,000,000 tons.

During the past season it was not found necessary to reopen closed ore mines as capacity of those kept open the past few years was sufficient to fill all needs and there was enough skilled labor to operate them efficiently. There has been some dislocation of skilled labor in the mining region during the slack period of the past few years but from the isolated location of the Lake Superior mines this appears to have been somewhat less than in the more highly organized industrial regions. For this reason it is not believed great difficulty will be met in obtaining workers to man additional mines when demand for ore makes their opening necessary.

An interesting development in the Minnesota iron ore situation is the recent decision by the supreme court of Minnesota on the *ad valorem* tax cases which have been in litigation over several years. This constitutes a victory for the ore companies as the supreme court upheld the decision of the district court in the case of all but two properties, the latter being sent back for review, the court holding that sufficient relief had not been granted.

The original cases involved 43 ore properties on the Mesabi range. The district court allowed a reduction of about 20 per cent from the valuation set by the tax commission. The taxes were defaulted from 1932 to 1935, inclusive, to a total of about $7,500,000 which now will be released from payment to the state. The valuation of unmined ore in the 43 properties involved is set by this decision at $81,683,377. The valuation set by the tax commission, to which the ore companies made protest, was $100,477,732, which the district court reduced to $81,864,845. The supreme court ordered a further reduction in the case of the two companies whose cases were remanded for revision, this amounting to $181,468. The court upheld the contention that Lake Erie prices for ore constitute an equitable basis for determining ore values, following a custom of 20 years standing.

A forecast of the probable course of ore prices for the next few years, as stated by an experienced ore man, depends entirely on the cost of production, and this in turn depends on the movement of wages at the mines and in the transportation field. Should a general advance in wages involve miners and transportation employes on the Great Lakes cost of production would rise and prices of ore necessarily would be set at a higher level to meet this added expense.

As the case now stands ore prices have been unchanged from the date of the buying movement in 1929 to the present, a span of eight years. The last change was an advance of 25 cents per ton at the beginning of the 1929 season. Pig iron prices are $2.50 higher at present than at the date of buying movement in 1929.

IF THE steel industry finds itself less than fully prepared in any of its raw material supplies the deficiency would appear to be in facilities for supplying sufficient coke to meet the demand incident to a heavily increased production of pig iron.

During the depths of the period of slack demand for steel the matter of coke supply received little attention and from 1931 to 1936 no by-product coke ovens were built. Existing ovens were more than sufficient to supply needed tonnage and so low did demand for coke fall that the beehive industry practically passed out of the picture. With the slow upswing from the low point of steel production need for greater coke tonnage did not make itself felt to the same degree as need for larger capacity for the popular rolling mill products, sheets and strip.

As a result no coke oven construction was under-

(*Please turn to Page* 427)

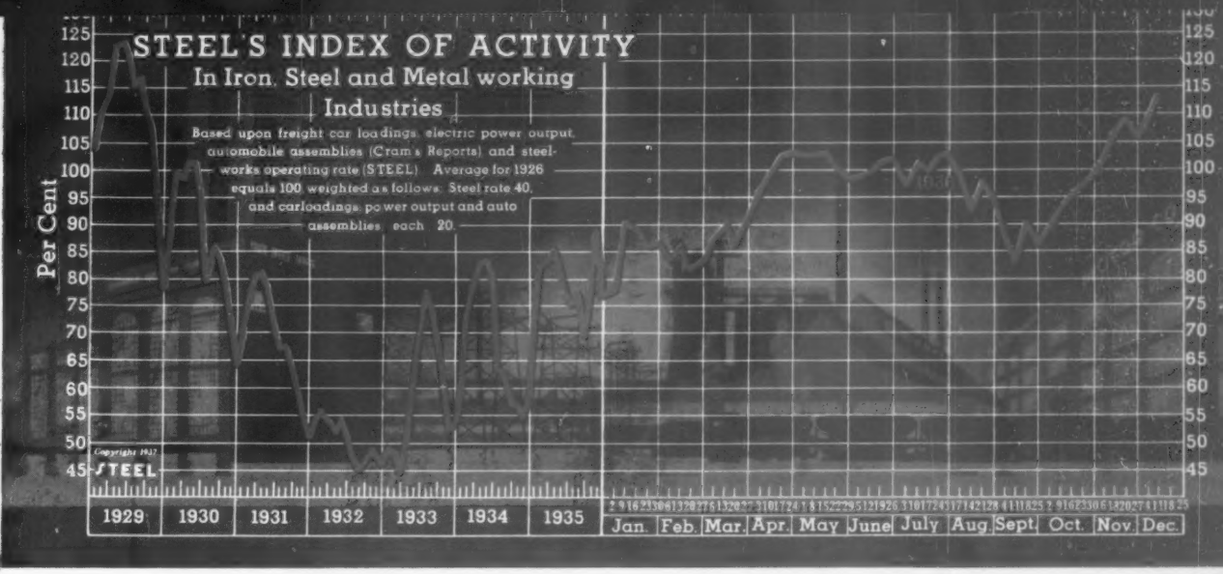
INVITING BANK RELATIONSHIPS OF ALL KINDS

EVERY MODERN BANKING FACILITY

CENTRAL NATIONAL BANK

of Cleveland

MEMBER FEDERAL DEPOSIT CORPORATION


STEEL'S INDEX OF ACTIVITY
In Iron, Steel and Metal working Industries
Based upon freight car loadings, electric power output, automobile assemblies (Cram's Reports) and steelworks operating rate (STEEL). Average for 1926 equals 100, weighted as follows: Steel rate 40, and carloadings, power output and auto assemblies each 20.
Per Cent
Copyright 1937 STEEL
1929 1930 1931 1932 1933 1934 1935
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Week ending	1936	1935	1934	1933		1936	1935	1934	1933
Nov. 7	102.1	88.4	54.9	50.7	Nov. 28	105.8	86.0	51.9	49.7
Nov. 14	107.9	88.8	55.2	52.6	Dec. 5	108.4	91.7	56.6	52.6
Nov. 21	109.9	90.9	54.4	55.4	Dec. 12	113.9	91.8	60.6	56.0
					Dec. 19	114.8	91.9	64.4	58.0

THE BUSINESS TREND

STUDENTS of business trends, studying the charts of activity in 1936 and 1935, have reason to ask whether the recovery period has brought forth a new seasonal pattern. During the past two years, the peak of industrial activity has occurred in the fourth quarter. During the depression it was definitely in the second quarter. In the lush days of the pre-depression era it fluctuated between the second and third quarters.

The change may be attributed in part to the shifting of the automobile show season. But there must be other factors. Whatever the cause, it is beneficial in that the new distribution tends to level the peaks and valleys of the former patterns.

This is apparent in the trend line of 1936, which reflects sustained stability at high levels. For three quarters chief support for activity came largely from the consumers' goods industries. In the final three months a strong surge of demand emanating from the authorization of capital expenditures helped to carry STEEL'S index to a peak of 114.8 in the third week of December.

All four factors represented in STEEL'S index moved into higher ground in 1936. Electric power output established new all-time records repeatedly during the year. Steelworks operations, which averaged 48 per cent of capacity in 1935, in 1936 averaged 68 per cent. Car loadings in October, 1936, climbed into the 800,000 bracket for the first time since 1930. Automobile production rose to higher weekly levels in 1936 than in the previous year.

Except for a continued noticeable lag in building construction, industry enters the new year with a better balanced distribution of activity than at any time since 1928.

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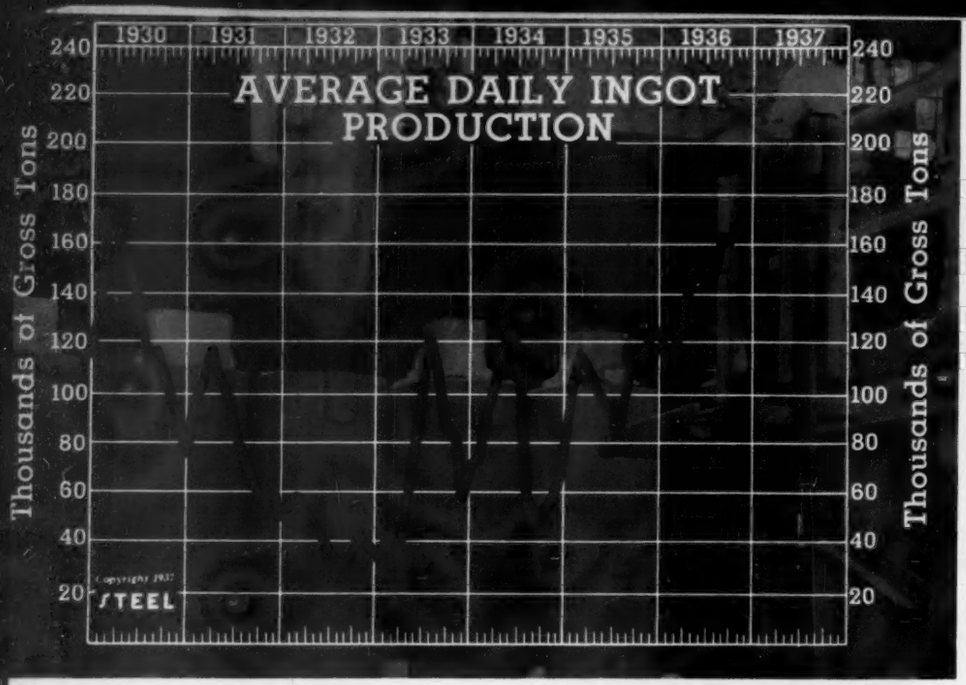
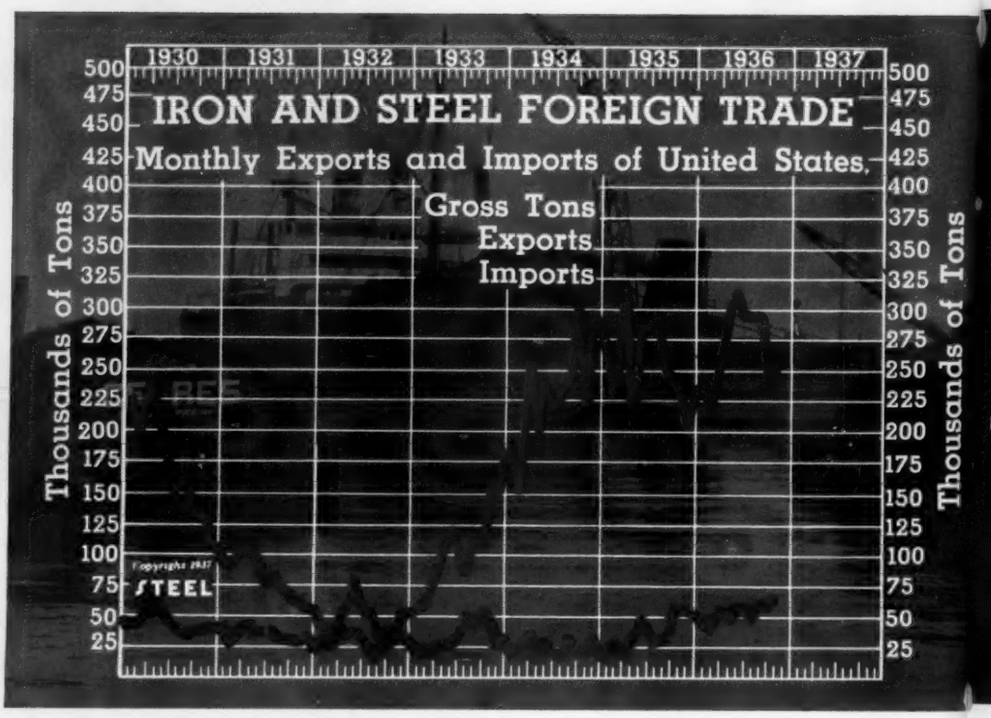


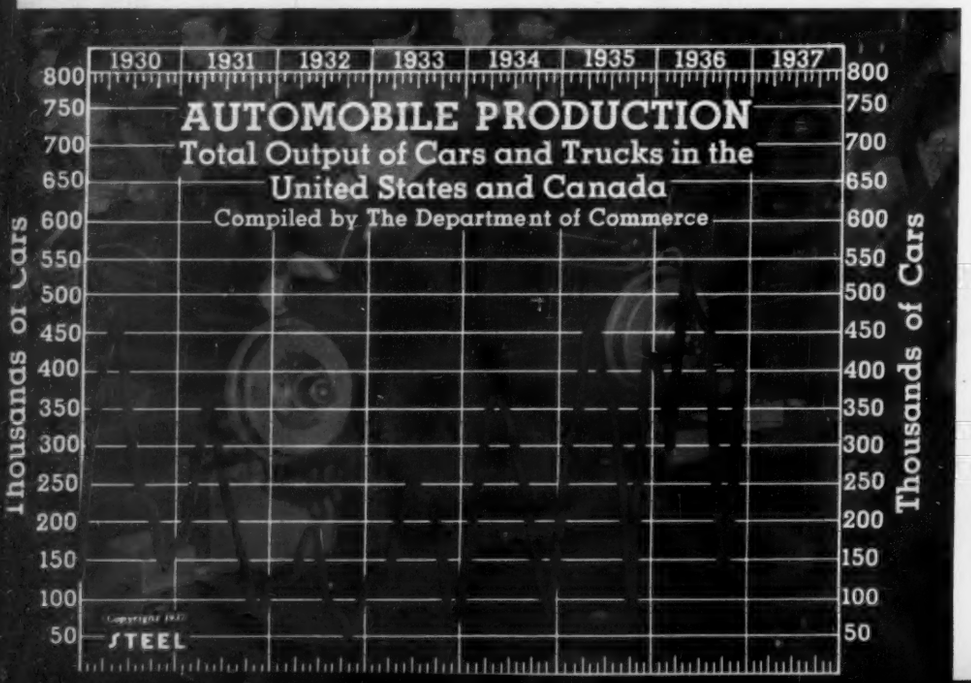
Average Daily Ingot Output

	Gross Tons		
	1936	1935	1934
Jan.	112,813	106,302	73,968
Feb.	118,577	115,595	92,164
March	128,576	110,204	103,646
April	151,625	101,562	117,443
May	155,625	97,543	125,907
June	153,263	90,347	117,672
July	150,874	87,224	59,578
Aug.	161,351	107,997	51,161
Sept.	160,043	113,000	50,759
Oct.	168,333	116,398	54,885
Nov.	173,496	121,170	61,947
Dec.	.....	122,936	78,570

Iron and Steel Foreign Trade

	1936		1935	
	Imports	Exports	Imports	Exports
Jan.	50,489	241,564	22,784	262,740
Feb.	43,358	213,802	28,905	228,537
Mar.	56,720	264,337	21,409	323,035
Apr.	49,621	301,987	28,866	205,336
May	59,391	314,950	47,719	286,598
June	59,910	294 951	33,208	286,333
July	47,940	296,738	31,894	296,782
Aug.	60,697	295,341	32,312	247,312
Sept.	59,993	235,571	53,158	244,419
Oct.	64,509	261,882	59,569	238,358
Nov.	.....	.....	56,637	205,242
Dec.	.....	.....	53,678	239,268


IRON AND STEEL FOREIGN TRADE
Monthly Exports and Imports of United States
Gross Tons
Exports
Imports
1930 1931 1932 1933 1934 1935 1936 1937
Thousands of Tons
500 475 450 425 400 375 350 325 300 275 250 225 200 175 150 125 100 75 50 25
STEEL

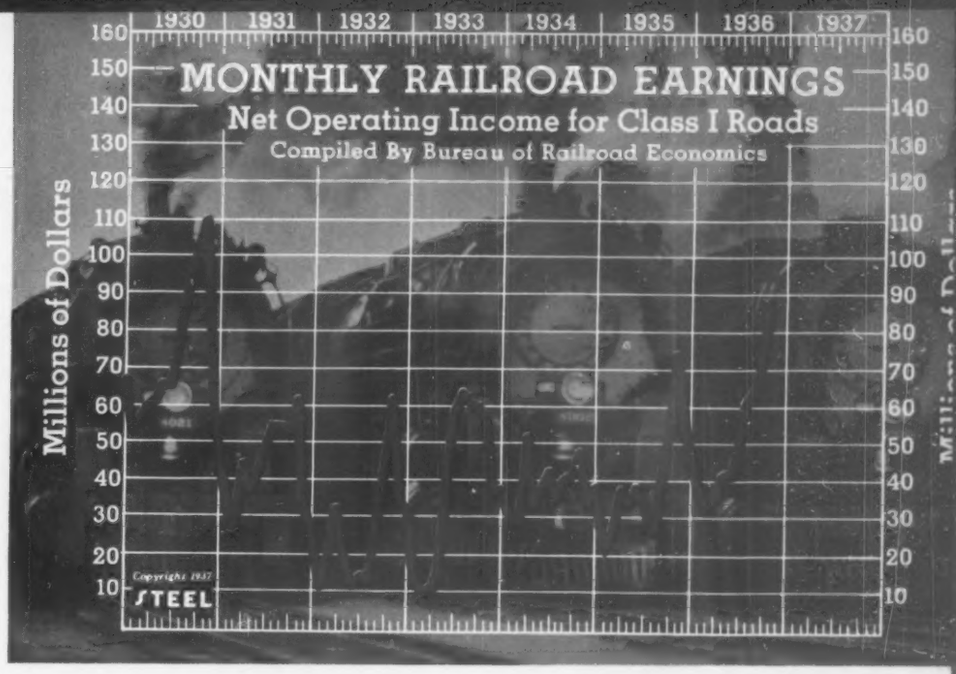

AUTOMOBILE PRODUCTION
Total Output of Cars and Trucks in the United States and Canada
Compiled by The Department of Commerce
1930 1931 1932 1933 1934 1935 1936 1937
Thousands of Cars
800 750 700 650 600 550 500 450 400 350 300 250 200 150 100 50
STEEL

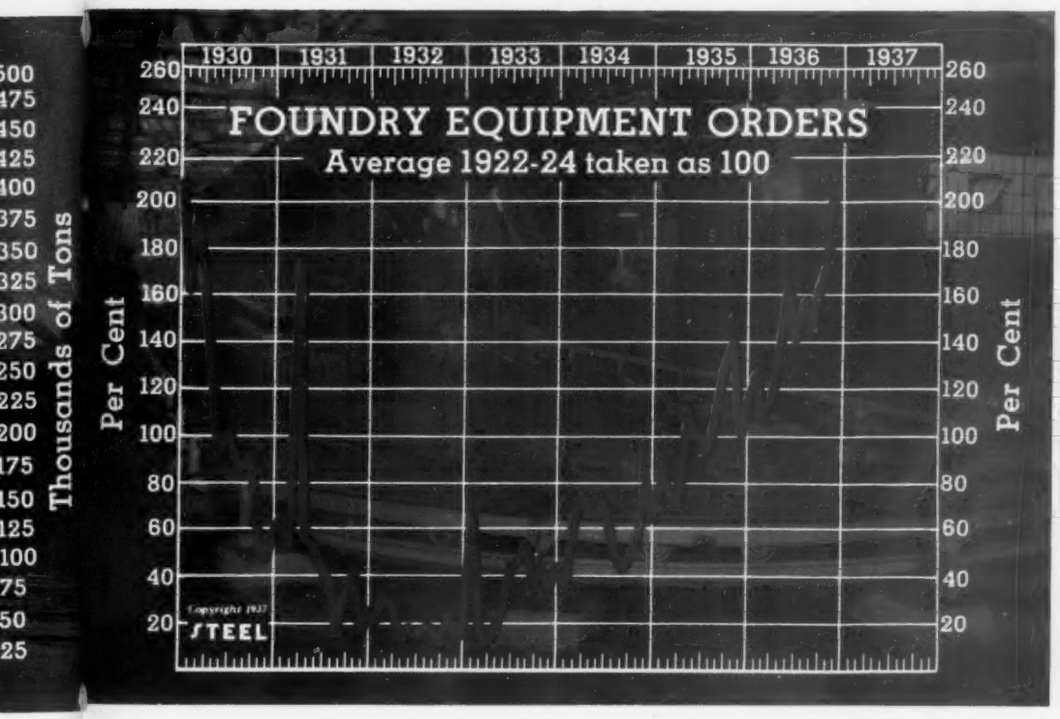
Auto Output U. S. and Canada

	1936	1935
January	377,306	300,325
February	300,874	350,345
March	438,945	447,888
April	527,726	477,059
May	480,571	381,809
June	470,887	372,085
July	451,474	345,178
August	275,951	245,092
September	139,785	92,863
October	229,989	280,356
November	405,702	408,555
December	.....	418,303

Railroad Earnings

	1936	1935	1934
Jan.	$35,764,748	$21,348,557	$31,058,275
Feb.	33,594,718	25,719,919	29,420,772
March	35,205,513	37,850,965	52,217,083
April	41,547,644	45,625,786	32,433,939
May	41,842,147	39,505,069	39,699,194
June	50,312,580	34,102,703	42,037,757
July	61,773,765	26,919,343	35,441,265
Aug.	64,680,717	42,156,706	40,564,071
Sept.	70,166,026	57,359,339	41,713,425
Oct.	89,851,409	75,425,092	49,336,307
Nov.	.....	54,234,305	32,540,502
Dec.	.....	46,040,165	38,738,295


MONTHLY RAILROAD EARNINGS
Net Operating Income for Class I Roads
Compiled By Bureau of Railroad Economics
1930 1931 1932 1933 1934 1935 1936 1937
Millions of Dollars
Copyright 1937
STEEL

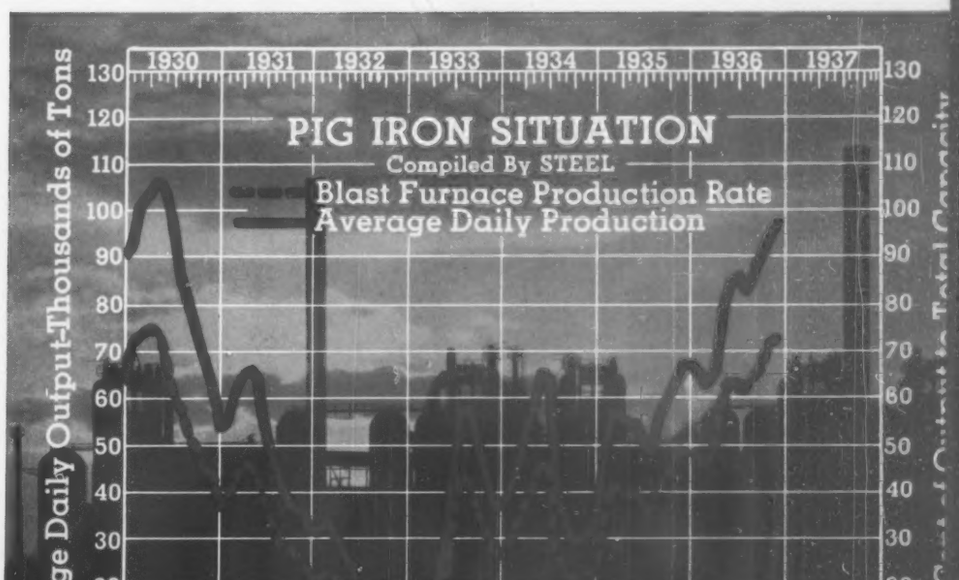


Foundry Equipment Orders

	Per Cent			
	1936	1935	1934	1933
Jan.	127.0	76.6	37.2	68.4
Feb.	110.4	75.7	65.8	16.1
March ...	115.0	69.4	75.4	9.8
April	134.0	113.2	67.9	19.4
May	165.4	100.7	66.5	25.6
June	141.4	100.2	70.4	45.5
July	159.6	94.0	50.7	48.8
Aug.	144.8	113.0	43.1	56.3
Sept.	161.0	128.5	46.4	34.9
Oct.	173.8	140.0	55.3	42.5
Nov.	200.4	100.4	80.4	36.6
Dec.	....	118.1	66.9	43.8

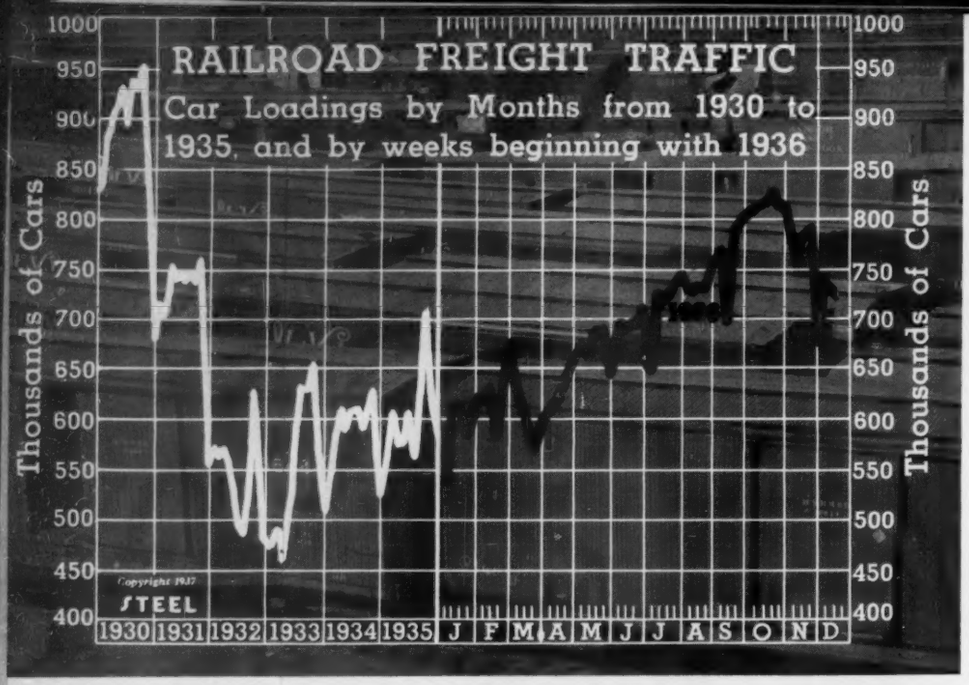
Blast Furnace Output and Rate

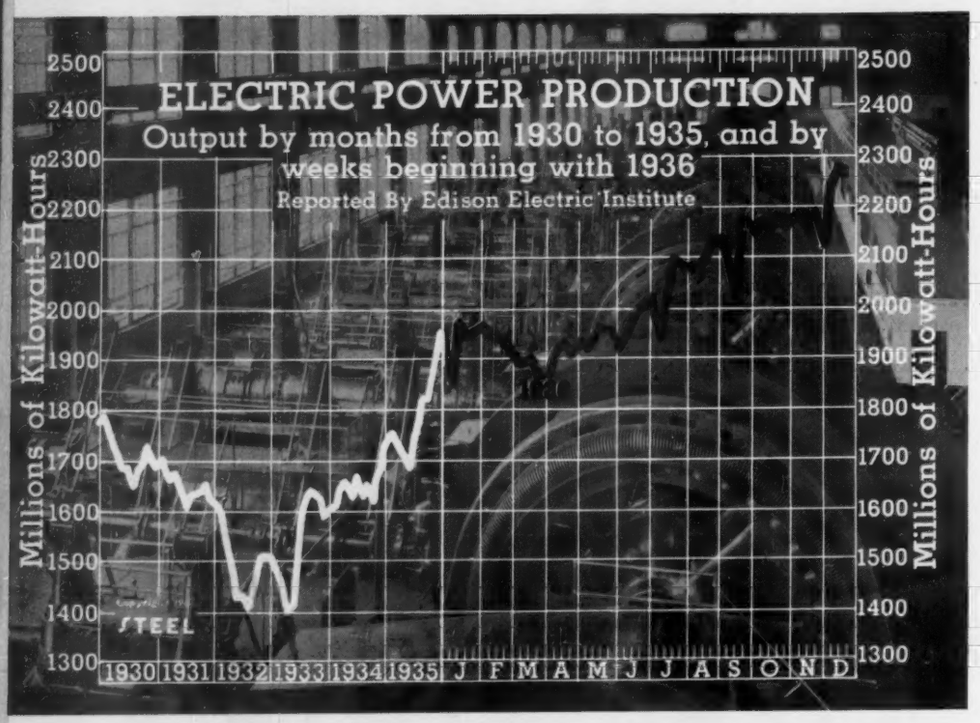
	Daily Average, Tons		Blast Furnace Rate, Per Cent	
	1936	1935	1936	1935
Jan.	65,461	47,692	48.2	34.2
Feb.	63,411	57,675	46.6	41.4
Mar.	66,004	57,120	48.5	41.0
Apr.	80,316	55,719	59.1	40.0
May	85,795	55,986	63.1	40.2
June	86,551	51,949	63.6	37.2
July	83,735	49,043	61.5	35.2
Aug.	87,475	56,767	64.3	40.7
Sept.	90,942	59,009	66.9	42.5
Oct.	96,509	63,818	71.0	45.8
Nov.	98,331	68,876	72.3	49.5
Dec.	.....	68,242	....	49.0

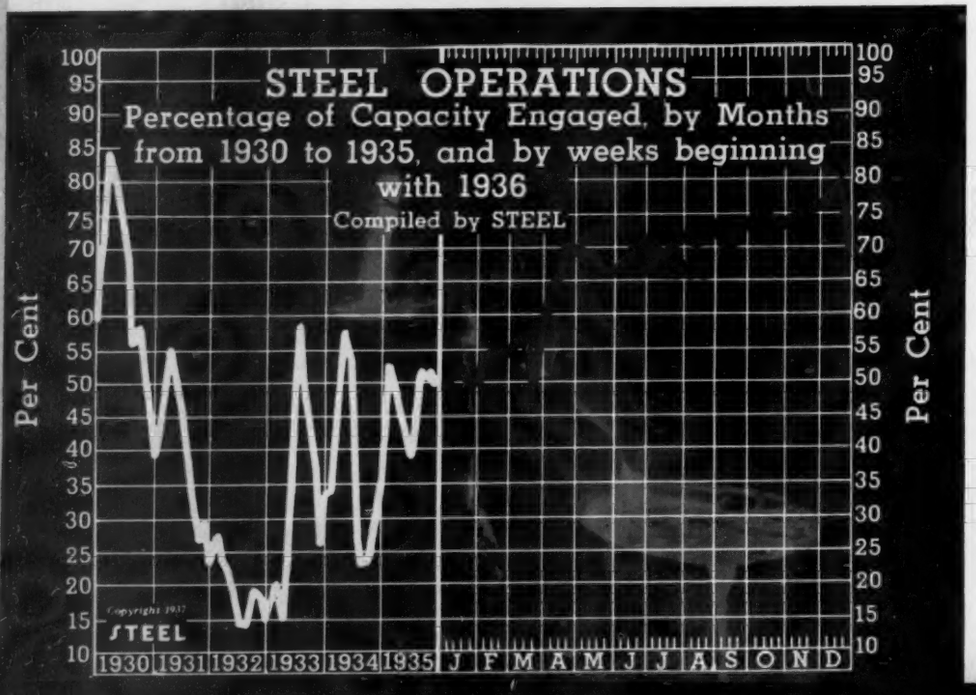


PER CENT
140
120
100
80
60
40
20
1930
1931
1932
STEEL

This chart, based upon the monthly averages of STEEL'S index of activity in the iron, steel and metalworking industries, shows the fluctuations through an almost compiete business cycle—boom, recession, depression, recovery and imminent boom.



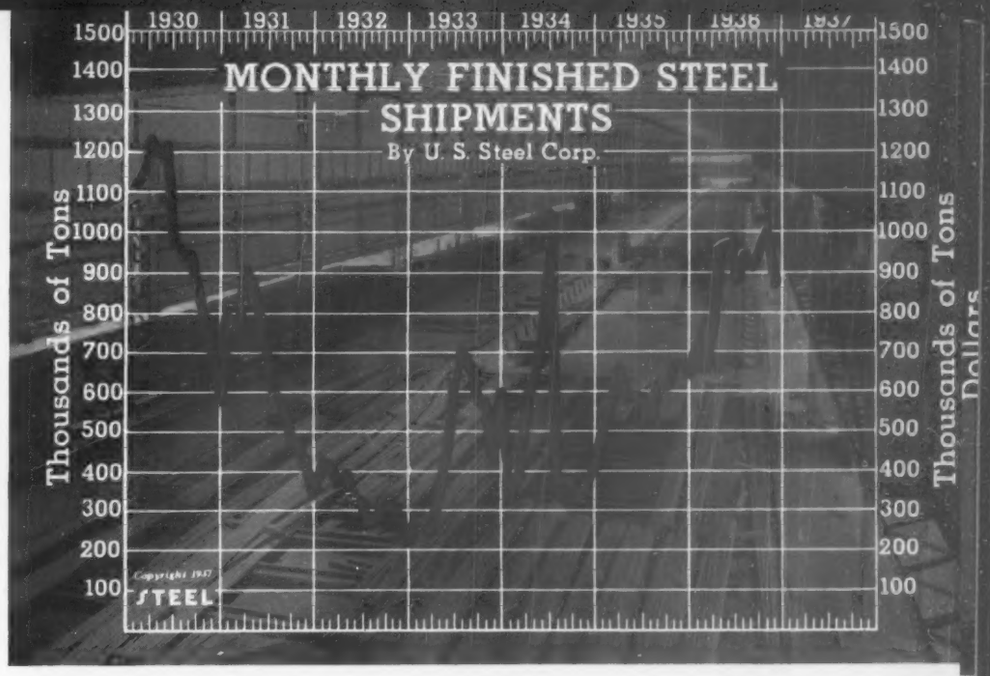




	Freight Car Loadings (Cars)	Electric Power Output (Million Kw.-Hrs.)	Steelworks Operating Rate (Per Cent)
Jan. 4	541,984	1,854	49.5
Jan. 11	615,028	1,970	51.5
Jan. 18	611,408	1,949	52.5
Jan. 25	584,691	1,955	50
Feb. 1	621,839	1,962	50
Feb. 8	622,097	1,952	53
Feb. 15	631,347	1,950	54.5
Feb. 22	586,712	1,941	54.5
Feb. 29	673,123	1,903	54.5
March 7	634,828	1,893	55.5
March 14	616,862	1,900	57.5
March 21	566,808	1,862	50
March 28	600,487	1,867	58.5
April 4	613,867	1,916	63.5
April 11	622,138	1,933	66.5
April 18	642,657	1,914	70.5
April 25	666,181	1,932	69.5
May 2	671,154	1,928	69.5
May 9	668,935	1,947	68.5
May 16	681,447	1,961	68.5
May 23	683,406	1,954	66.5
May 30	646,859	1,922	66
June 6	695,845	1,945	67
June 13	686,812	1,989	68
June 20	690,716	2,005	70.5
June 27	713,639	2,029	71.5
July 4	649,759	1,956	66
July 11	724,324	2,029	69.5
July 18	720,402	2,099	68.5
July 25	731,062	2,088	70.5
Aug. 1	747,551	2,079	71.5
Aug. 8	728,293	2,079	71.5
Aug. 15	736,497	2,093	70.5
Aug. 22	734,973	2,125	72
Aug. 29	753,742	2,135	73
Sept. 5	764,680	2,098	71.5
Sept. 12	699,859	2,028	69.5
Sept. 19	789,510	2,170	72.5
Sept. 26	807,070	2,157	73
Oct. 3	819,126	2,169	74.5
Oct. 10	820,195	2,168	75
Oct. 17	826,155	2,170	75
Oct. 24	815,972	2,166	73
Oct. 31	814,175	2,175	73
Nov. 7	759,318	2,169	73
Nov. 14	784,672	2,169	74
Nov. 21	790,500	2,196	74.5
Nov. 28	679,984	2,133	75.5
Dec. 5	744,957	2,243	76.5
Dec. 12	738,747	2,278	77.5
Dec. 19	729,696	2,274	79.5
Dec. 26	.....	.....	68

Steel Shipments, U. S. Steel Corp.

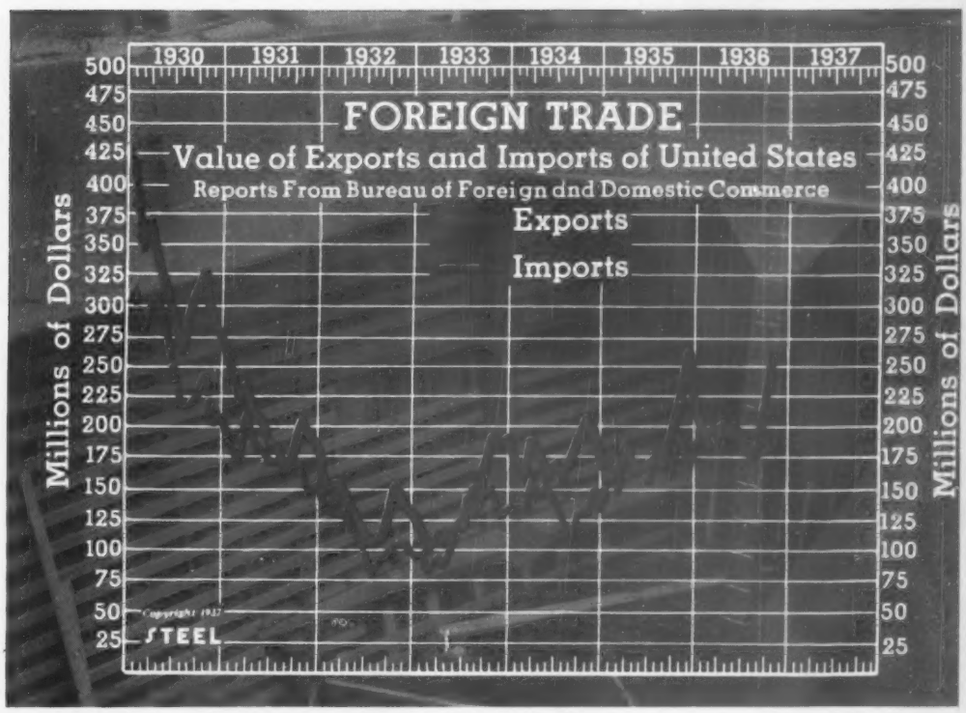
	Gross Tons		
	1936	1935	1934
Jan.	721,414	534,055	331,777
Feb.	676,315	583,137	385,500
March	783,552	668,056	588,209
April	979,907	591,728	643,009
May	984,097	598,915	745,063
June	886,065	578,108	985,337
July	950,851	547,794	331,777
Aug.	923,703	624,497	378,023
Sept.	961,803	614,933	370,306
Oct.	1,007,417	686,741	343,962
Nov.	882,643	681,820	566,119
Dec.	.....	661,515	418,630

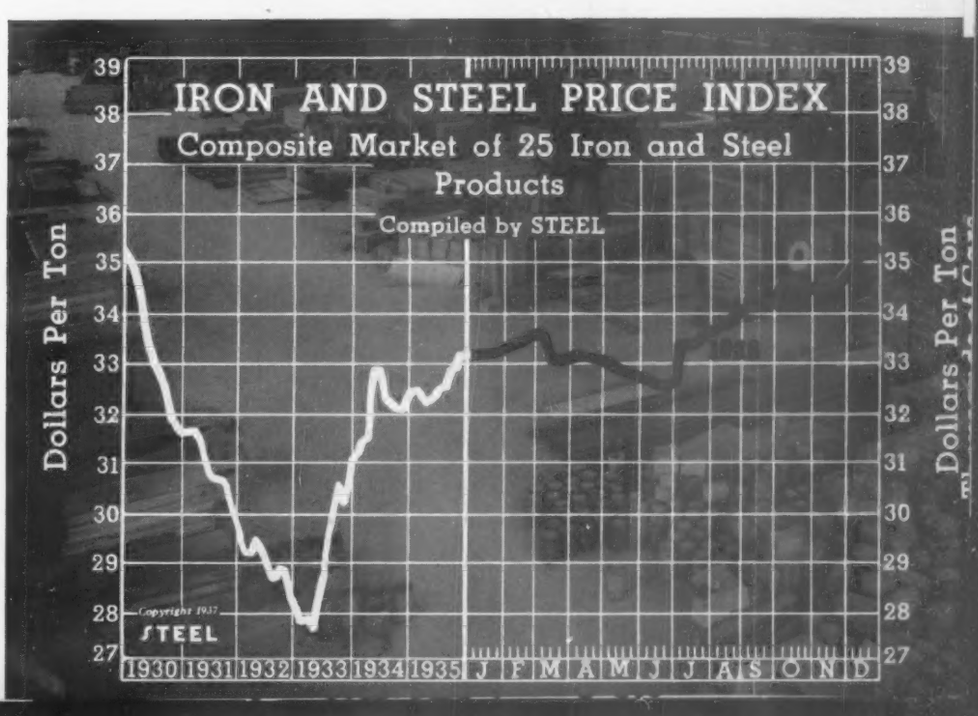

MONTHLY FINISHED STEEL SHIPMENTS
By U. S. Steel Corp.
Thousands of Tons
Thousands of Tons
1930 1931 1932 1933 1934 1935 1936 1937
Copyright 1937 STEEL

Merchandise Foreign Trade

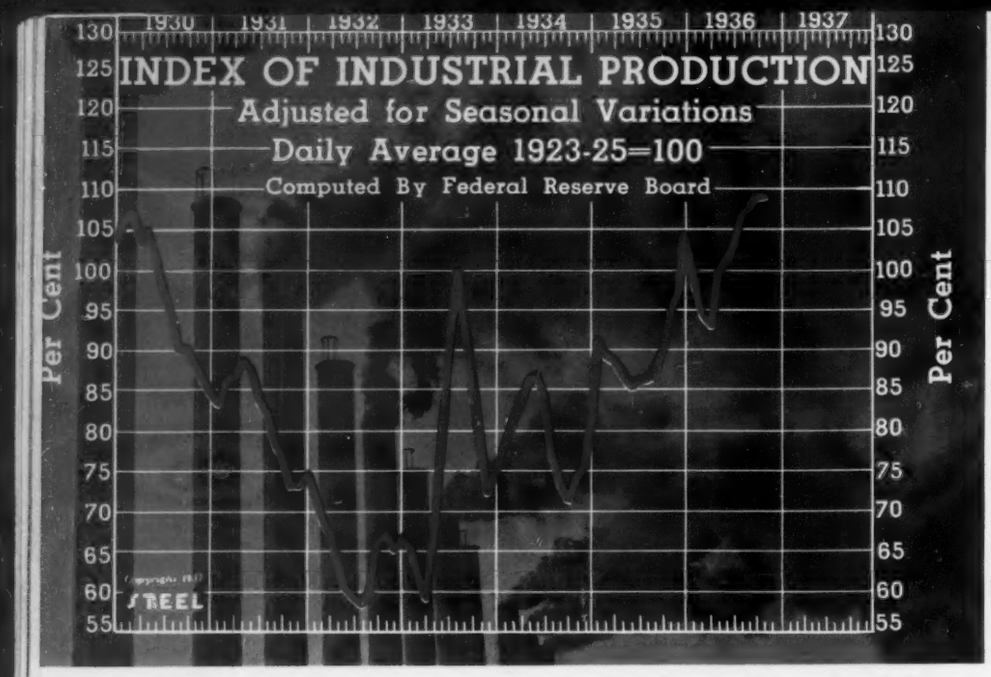
Dollars (000 omitted)

	1936		1935	
	Exports	Imports	Exports	Imports
Jan.	198,654	187,482	176,223	166,993
Feb.	182,030	192,771	162,999	152,491
Mar.	194,790	198,686	185,603	177,279
Apr.	193,490	202,437	164,350	170,567
May	201,042	191,110	165,457	170,207
June	185,188	192,233	170,193	156,756
July	178,324	193,409	173,371	177,698
Aug.	178,249	195,016	172,128	169,030
Sept.	219,976	215,525	198,189	161,653
Oct.	264,708	212,001	221,215	189,240
Nov.	.....	.....	269,400	168,955
Dec.	.....	.....	223,737	186,648


FOREIGN TRADE
Value of Exports and Imports of United States
Reports From Bureau of Foreign dnd Domestic Commerce
Exports
Imports
Millions of Dollars
Millions of Dollars
1930 1931 1932 1933 1934 1935 1936 1937
Copyright 1937 STEEL

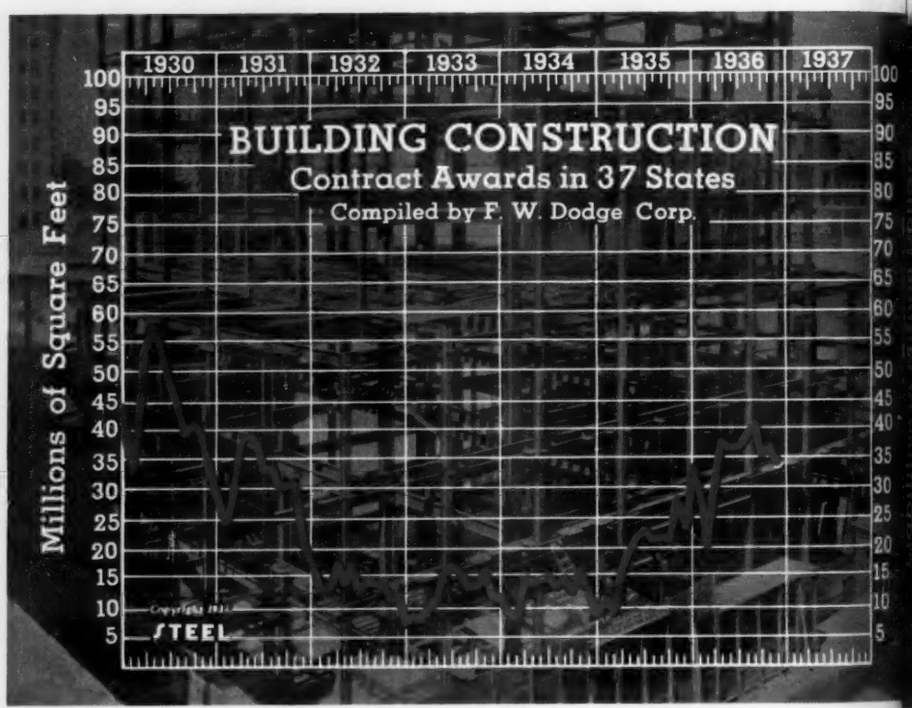

IRON AND STEEL PRICE INDEX
Composite Market of 25 Iron and Steel Products
Compiled by STEEL
Dollars Per Ton
Dollars Per Ton
1930 1931 1932 1933 1934 1935 J F M A M J J A S O N D
Copyright 1937 STEEL

Statistics showing STEEL'S composite average of 25 iron and steel prices will be found on page 359 of this issue.



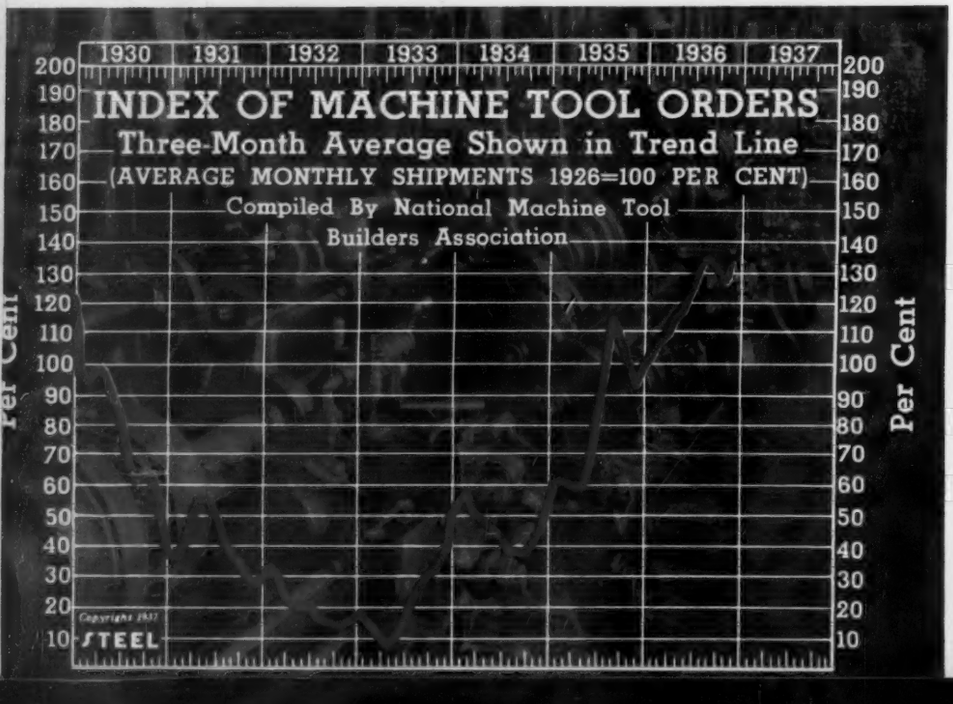
Index of Industrial Production

	1936	1935	1934	1933
January	98	91	78	65
February	94	89	81	64
March	93	88	84	60
April	100	86	85	67
May	101	85	86	77
June	103	86	84	91
July	107	86	75	100
August	108	87	73	91
September	109	89	71	84
October	109	95	73	77
November	...	98	74	73
December	...	104	86	75


1930 1931 1932 1933 1934 1935 1936 1937
BUILDING CONSTRUCTION
Contract Awards in 37 States
Compiled by F. W. Dodge Corp.
Millions of Square Feet
STEEL

Contract Awards in 37 States

	Square Feet		
	1936	1935	1934
Jan.	27,053,300	11,245,100	9,568,700
Feb.	20,856,700	9,670,300	8,176,300
Mar.	31,308,100	15,845,300	14,788,900
Apr.	37,490,200	19,917,300	14,207,100
May	36,362,100	22,276,200	14,664,400
June	36,883,900	22,878,800	13,986,500
July	38,762,500	21,565,900	13,250,000
Aug.	40,285,100	21,545,400	14,259,000
Sept.	35,448,000	21,365,700	12,510,300
Oct.	36,718,900	27,775,900	15,098,100
Nov.	34,947,500	24,120,700	12,780,800
Dec.	.....	33,441,900	9,188,700


1930 1931 1932 1933 1934 1935 1936 1937
INDEX OF MACHINE TOOL ORDERS
Three-Month Average Shown in Trend Line
(AVERAGE MONTHLY SHIPMENTS 1926=100 PER CENT)
Compiled By National Machine Tool Builders Association
Per Cent
STEEL

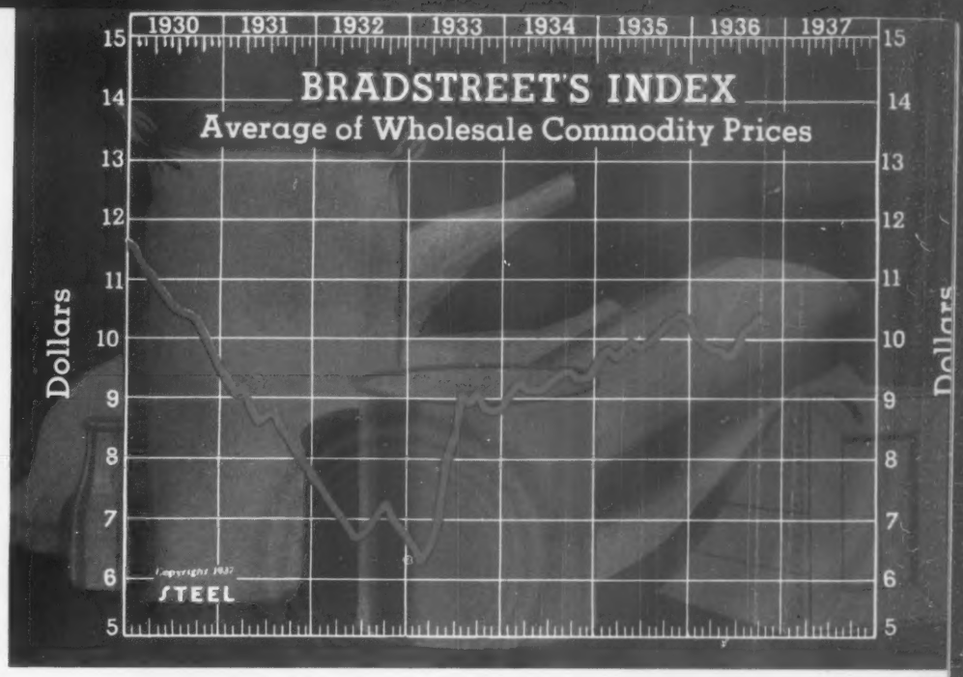
Index of Machine Tool Orders

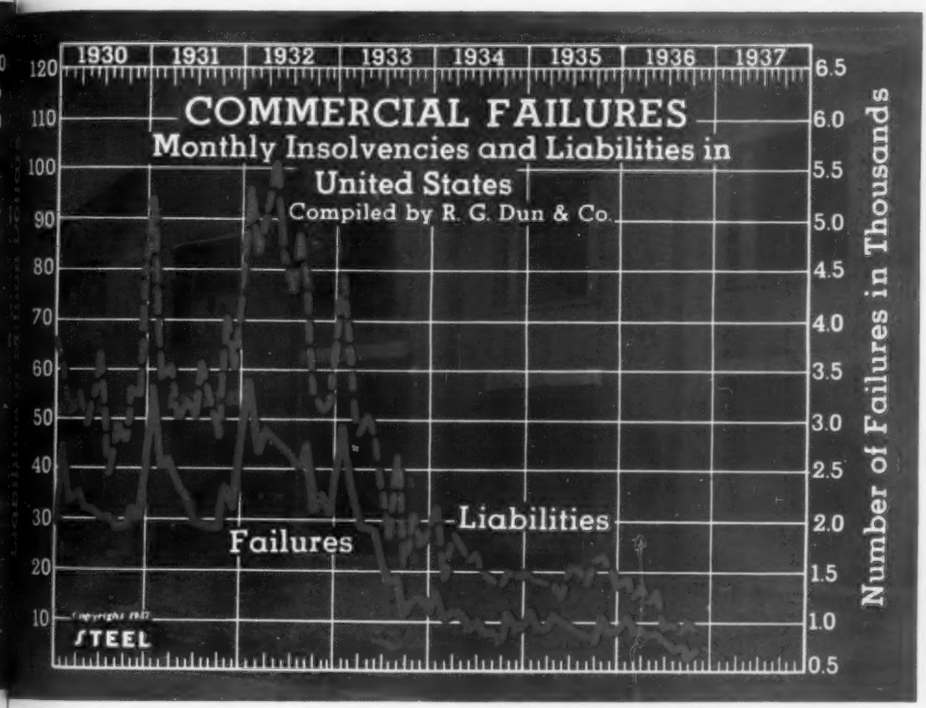
Three-month Average

	1936	1935	1934	1933
Jan.	102.6	61.3	56.5	18.3
Feb.	107.1	61.5	58.2	15.2
March	109.4	60.3	50.9	11.1
April	114.4	60.3	48.5	8.3
May	116.6	67.1	46.8	10.6
June	124.5	76.7	42.6	15.5
July	132.6	94.7	38.6	22.4
Aug.	135.5	112.2	37.1	27.9
Sept.	132.0	108.5	37.4	30.9
Oct.	127.5	102.9	40.5	33.3
Nov.	134.0	93.8	44.2	38.0
Dec.	.....	99.9	54.1	51.0

Index of Commodity Prices

	1936	1935	1934	1933
Jan. 1	$10.36	$9.49	$9.01	$6.53
Feb. 1	10.02	9.78	9.26	6.53
Mar. 1	9.92	9.79	9.17	6.54
Apr. 1	9.85	9.66	9.16	6.98
May 1	9.81	9.79	9.14	8.02
June 1	9.73	9.90	9.24	8.34
July 1	9.85	9.84	9.32	9.01
Aug. 1	10.14	9.91	9.48	8.99
Sept. 1	10.19	10.00	9.45	9.05
Oct. 1	10.27	10.17	9.27	8.84
Nov. 1	10.22	10.28	9.29	8.81
Dec. 1	.....	10.40	9.49	8.83


1930 1931 1932 1933 1934 1935 1936 1937
BRADSTREET'S INDEX
Average of Wholesale Commodity Prices
Dollars
Dollars
15 14 13 12 11 10 9 8 7 6 5
STEEL


1930 1931 1932 1933 1934 1935 1936 1937
COMMERCIAL FAILURES
Monthly Insolvencies and Liabilities in United States
Compiled by R. G. Dun & Co.
Failures
Liabilities
Number of Failures in Thousands
120 110 100 90 80 70 60 50 40 30 20 10
6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
STEEL

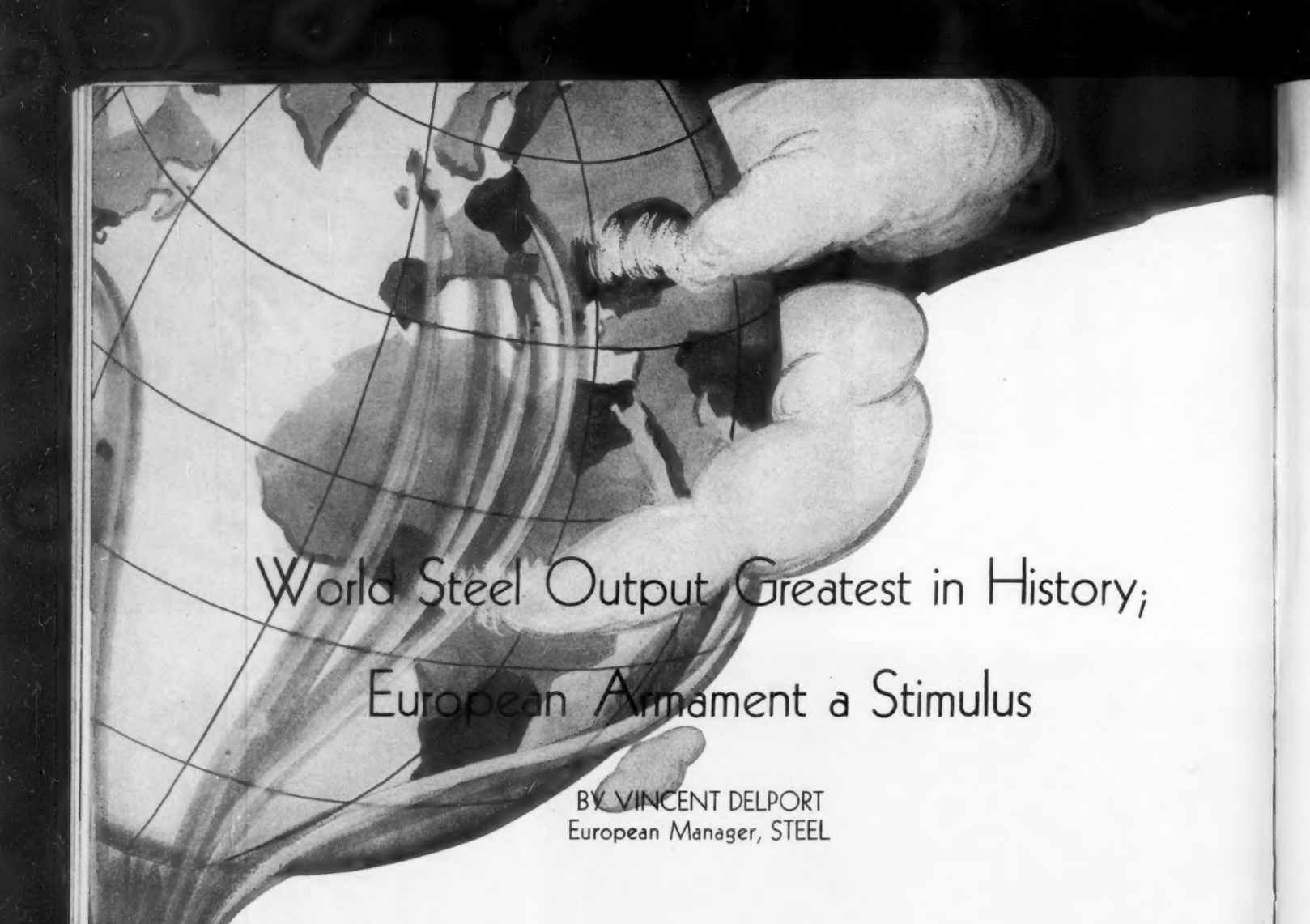
Failures and Liabilities in U. S.

	Failures, Number		Liabilities, Dollars (000 omitted)	
	1936	1935	1936	1935
Jan.	1,077	1,146	$18,104	$14,603
Feb.	856	956	14,089	15,217
March	946	940	16,271	15,361
April	830	1,083	14,157	16,529
May	832	1,004	15,375	14,339
June	773	944	9,177	12,918
July	639	902	9,904	16,523
Aug.	655	884	8,271	13,266
Sept.	586	787	9,819	17,002
Oct.	611	1,056	8,266	17,185
Nov.	...	898	.....	14,384
Dec.	...	910	.....	15,686

Railroad Freight Car Awards

	1936	1935	1934	1933
Jan.	2,050	24	152	3
Feb.	6,900	806	19,725	0
March	632	0	30	5
April	4,427	350	800	50
May	8,900	2	717	8
June	5,220	5,151	1,835	500
July	7,229	500	19	306
Aug.	225	200	105	202
Sept.	1,750	875	7	23
Oct.	2,210	1,250	75	514
Nov.	1,550	100	254	533
Dec.	....	10,050	110	316

1930 1931 1932 1933 1934 1935 1936 1937
RAILROAD CAR ORDERS
Record of Railroad Freight Car Buying
Compiled By STEEL
Thousands of Cars
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
STEEL



World Steel Output Greatest in History; European Armament a Stimulus

BY VINCENT DELPORT
European Manager, STEEL

STIMULATED by the general revival of trade, which itself necessitated new plant and replacements, and also by the European race for "defensive" armaments, the world output of steel in 1936 topped the 120 million mark, thus exceeding all previous records in the history of steelmaking.

As estimated by STEEL, the world output of steel ingots and castings in 1936 was 123,640,000 gross tons, an increase of 26.8 per cent over that of 1935. For pig iron the total production was 89,615,000 tons, against 70,000,000 tons in 1935, an increase of 23.2 per cent, the latter year's output being the largest since 1929.

The advance made by production in the United States was remarkable and attained 43 per cent for steel and 39 per cent for pig iron. The share of the United States in world production was 39 per cent for steel and 40 per cent for pig iron.

In Europe the nations of Europe produced 66,040,000 tons of steel, an increase of 31 per cent over 1935, and 52,050,000 tons of pig iron, an increase of 16 per cent. In both cases the increase was higher than in the previous year. The proportion of pig iron produced in the world was 58 per cent of the total steel output.

Again in 1936 Russia forged ahead of all other European nations in steel production, with an output of over 19 million tons and a pig iron production of 16 million tons. Her rate of increase in steel production was just on 20 per cent. Russia is now producing nearly 5 million tons of steel, 30 per cent more than Germany, and 4 million tons of pig iron, which is also 30 per cent more than Germany, and 33 per cent.

After Russia in steel production came Great Britain with 11,700,000 tons, France with 6,585,000 tons and Belgium with 3,120,000 tons. Japan, with five million tons in round figures, retained sixth place in world rank. For pig iron these nations ranked in the same order except for Japan, which country came immediately after Belgium.

The accompanying tables give the output of steel and pig iron of the principal countries of the world, the estimated figures for 1936 being compared with the production figures of previous years and 1913. The table of imports and exports of those countries most actively engaged in foreign trade shows a marked increase of exports from Germany, and a decrease of French exports. Great Britain experienced a substantial increase of imports.

On page 333 are given detailed comparisons of world production of steel ingots and castings, world production of pig iron, and exports and imports of principal countries. Per capita consumption of steel, shown by the characters in colors on the pages, are figured thus: Domestic production, plus imports, minus exports, divided by population.

On this basis the United States last year again led with a per capita consumption of 840 pounds, 44 per cent more than in 1935.

Germany, which in 1935 showed 491 pounds, only 1 pound less than Belgium-Luxemburg, in 1936 rose to 662 pounds, and Belgium-Luxemburg to 615 pounds. In order then came Great Britain with 483 pounds; [illegible] pounds; Russia 216 pounds; Japan 137

World Production of Steel Ingots and Castings

Gross Tons

	1936	1935	1934	1933	1932	1931	1930	1929	1928	1927
United States	48,800,000	34,093,000	25,714,000	23,156,000	13,500,000	25,630,000	40,278,000	55,650,000	50,887,000	44,935,000
Canada	1,050,000	915,000	741,000	403,000	335,000	671,000	1,009,000	1,391,000	1,240,000	907,000
Great Britain	11,700,000	9,859,000	8,850,000	7,024,000	5,261,000	5,203,000	7,326,000	9,636,000	8,520,000	9,099,000
France	6,585,000	6,177,000	6,075,000	6,427,000	5,550,000	7,697,000	9,296,000	9,544,000	9,348,000	8,173,000
Belgium	3,120,000	2,979,000	2,901,000	2,687,000	2,745,000	3,073,000	3,300,000	4,066,000	3,872,000	3,645,000
Luxemburg	1,960,000	1,808,000	1,901,000	1,815,000	1,925,000	2,002,000	2,234,000	2,659,000	2,526,000	2,431,000
Italy†	2,250,000	2,175,000	1,820,000	1,755,000	1,369,000	1,430,000	1,746,000	2,109,000	1,932,000	1,570,000
Spain	570,000	577,000	500,000	498,000	525,000	594,000	910,000	985,000	770,000	653,000
Sweden	940,000	882,000	848,000	620,000	520,000	530,000	601,000	683,000	567,000	491,000
Germany	19,300,000	16,184,000	11,725,000*	7,690,000	5,678,000	8,136,000	11,354,000	15,986,000	14,285,000	16,050,000
Austria	420,000	358,000	304,000	222,000	201,000	317,000	461,000	622,000	626,000	551,000
Czechia	1,505,000	1,177,000	938,000	749,000	662,000	1,490,000	1,721,000	2,103,000	1,704,000	1,662,000
Poland	1,140,000	930,000	831,000	805,000	542,000	1,020,000	1,217,000	1,355,000	1,226,000	1,226,000
Hungary	550,000	439,000	310,000	224,000	177,000	311,000	363,000	505,000	478,000	464,000
Russia	16,000,000	12,320,000	9,412,000	6,790,000	5,900,000	5,333,000	5,610,000	4,828,000	4,206,000	4,150,000
Japan	5,200,000	4,468,000	3,682,000	3,150,000	2,300,000	1,834,000	2,288,000	2,249,000	1,840,000	1,658,000
India	940,000	862,000	798,000	694,000	570,000	625,000	619,000	575,000	410,000	575,000
Australia	710,000	610,000	550,000	393,000	221,000	360,000	420,000	460,000	462,000	466,000
Saar††	.....	.....	1,919,000	1,649,000	1,440,000	1,513,000	1,904,000	2,174,000	2,040,000	1,865,000
Miscellaneous	900,000	800,000	450,000	350,000	300,000	350,000	400,000	400,000	350,000	305,000
WORLD TOTAL	123,640,000	97,613,000	80,269,000	67,101,000	49,721,000	68,119,000	93,057,000	117,980,000	107,477,000	100,876,000

*Without the Saar.
†In view of the Italian government's ban on the issuing of figures, the tonnages for 1935 and 1936 are our own estimates.
††Included with Germany for 1935 and 1936.
German figures in 1913 are for pre-war territory. Austrian figures in 1913 include the major portion of Czechia and Hungary. Japan's figures include Manchuria and Korea.

World Production of Pig Iron

Gross Tons

	1936	1935	1934	1933	1932	1931	1930	1929	1928	1927
United States	30,700,000	21,040,000	15,978,000	13,222,000	8,674,000	18,263,000	31,441,000	42,270,000	37,832,000	36,289,000
Canada	675,000	655,000	438,000	258,000	160,000	466,000	813,000	1,160,000	1,083,000	760,000
Great Britain	7,700,000	6,424,000	5,969,000	4,136,000	3,574,000	3,773,000	6,192,000	7,589,000	6,611,000	7,294,000
France	6,075,000	5,696,000	6,053,000	6,223,000	5,448,000	8,068,000	9,874,000	10,198,000	9,821,000	9,125,000
Belgium	3,140,000	3,011,000	2,860,000	2,667,000	2,705,000	3,180,000	3,311,000	4,030,000	3,843,000	3,692,000
Luxemburg	1,965,000	1,842,000	1,968,000	1,858,000	1,929,000	2,020,000	2,433,000	2,860,000	2,726,000	2,688,000
Italy†	750,000	675,000	564,000	544,000	481,000	532,000	569,000	718,000	545,000	487,000
Spain	350,000	350,000	338,000	334,000	296,000	468,000	606,000	740,000	552,000	603,000
Sweden	565,000	603,000	550,000	341,000	277,000	411,000	488,000	516,000	431,000	448,000
Germany	15,300,000	12,637,000	8,602,000*	5,183,000	3,870,000	5,964,000	9,540,000	13,187,000	11,615,000	12,893,000
Austria	245,000	190,000	132,000	87,000	93,000	143,000	282,000	455,000	451,000	428,000
Czechia	1,090,000	798,000	591,000	491,000	443,000	1,146,000	1,414,000	1,618,000	1,544,000	1,241,000
Poland	570,000	388,000	376,000	301,000	196,000	341,000	470,000	693,000	673,000	607,000
Hungary	300,000	183,000	138,000	92,000	65,000	157,000	253,000	362,000	281,000	294,000
Russia	14,000,000	12,411,000	10,273,000	7,085,000	6,101,000	4,782,000	4,920,000	4,253,000	3,322,000	3,290,000
Japan	2,800,000	2,724,000	2,400,000	2,019,000	1,525,000	1,385,000	1,635,000	1,491,000	1,520,000	1,263,000
India	1,560,000	1,466,000	1,331,000	1,065,000	914,000	1,072,000	1,180,000	1,348,000	1,055,000	1,145,000
Australia	680,000	620,000	500,000	336,000	190,000	380,000	308,000	420,000	410,000	550,000
Saar††	.....	.....	1,797,000	1,567,000	1,327,000	1,491,000	1,881,000	2,071,000	1,905,000	1,743,000
Miscellaneous	1,150,000	1,000,000	700,000	600,000	700,000	800,000	750,000	750,000	850,000	750,000
WORLD TOTAL	89,615,000	72,713,000	61,558,000	48,409,000	38,968,000	54,842,000	78,360,000	96,729,000	87,070,000	85,590,000

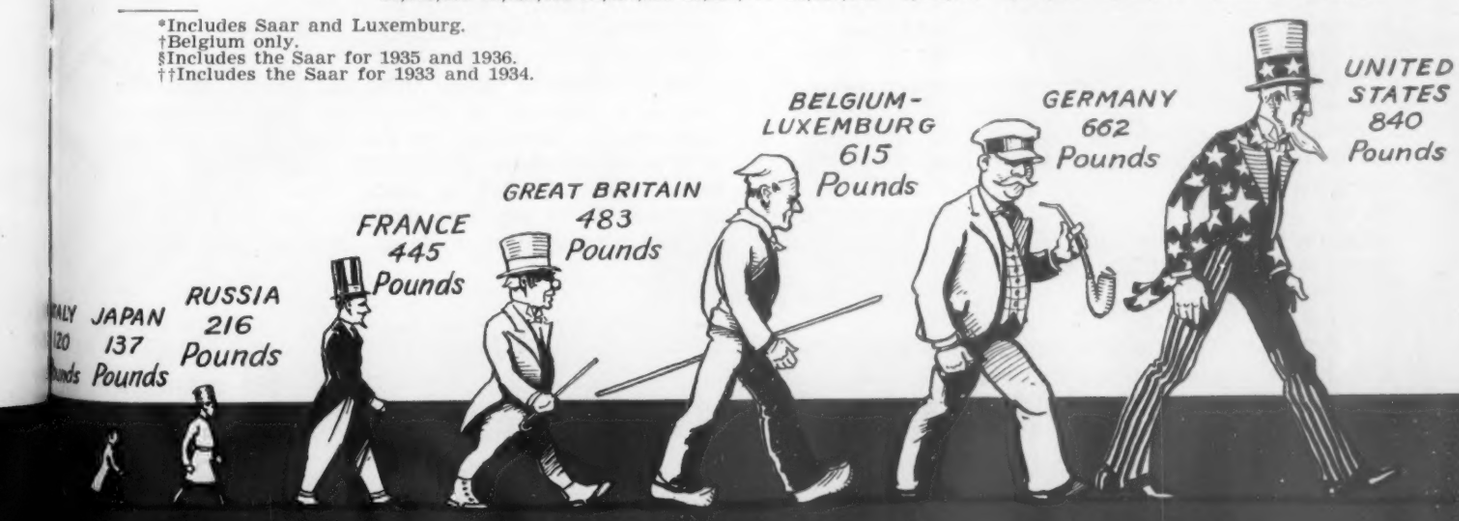
*Without the Saar.
†In view of the Italian government's ban on the issuing of figures, the tonnages for 1935 and 1936 are our own estimates.
††Included with Germany for 1935 and 1936.
German figures in 1913 are for pre-war territory. Austrian figures in 1913 include the major portion of Czechia and Hungary. Japan's figures include Manchuria and Korea.

Exports and Imports of the Principal Countries

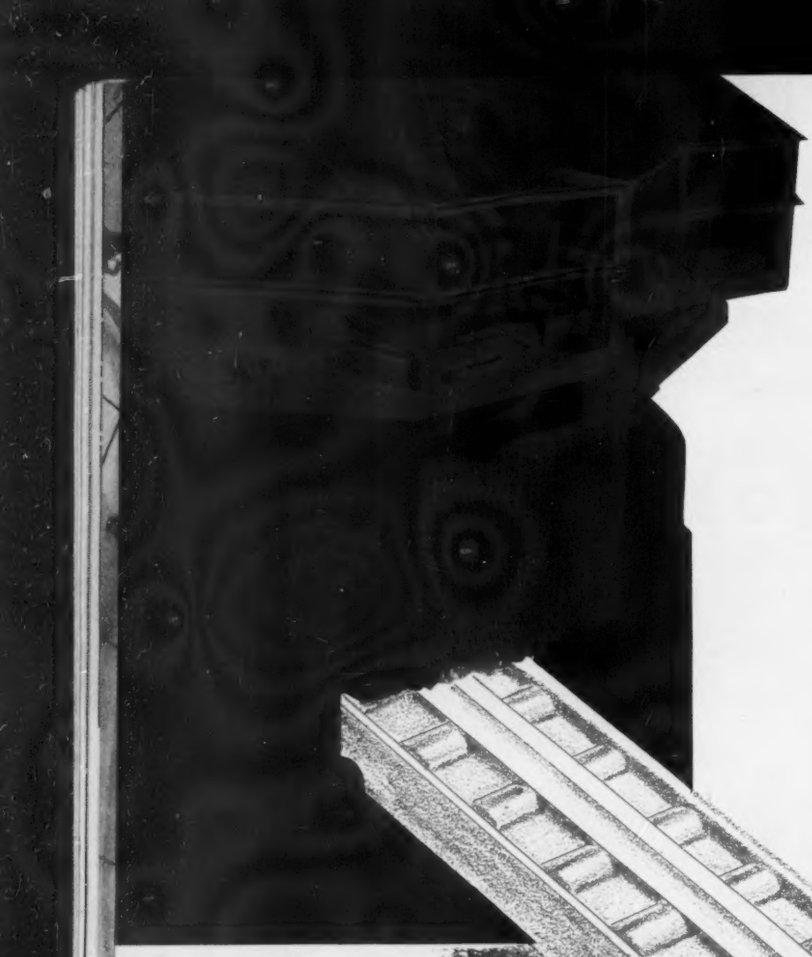
(Gross tons—Scrap eliminated)

	Exports					Imports				
Country	1936	1935	1934	1933	1913	1936	1935	1934	1933	1913
United States	1,150,000	1,020,000	997,000	569,000	2,648,000	520,000	405,000	272,000	358,000	273,000
Great Britain	2,200,000	2,372,000	2,253,000	1,922,000	4,969,000	1,560,000	1,152,000	1,367,000	971,000	2,331,000
Germany§	3,550,000	3,089,000	2,429,000	1,919,000	6,200,000*	485,000	635,000	1,377,000	924,000	300,000*
France††	1,550,000	1,842,000	3,030,000	2,672,000	640,000	165,000	170,000	200,000	249,000	185,000
Belgium and Luxemburg	3,125,000	3,129,000	3,345,000	3,150,000	1,550,000†	385,000	297,000	306,000	306,000	874,000†
	11,575,000	11,452,000	12,054,000	10,232,000	16,007,000	3,115,000	2,659,000	3,522,000	2,808,000	3,963,000

*Includes Saar and Luxemburg.
†Belgium only.
§Includes the Saar for 1935 and 1936.
††Includes the Saar for 1933 and 1934.



Auto Industry Leads in Steel in 1936; Railroads Gain



ANALYSIS of the reports of the distribution of finished rolled steel in 1936 shows that while the automobile industry continued to hold a commanding lead over all other consuming groups, the ratio of its consumption to the total declined appreciably.

In 1935, with a reported consumption of 5,005,784 gross tons, the automotive industry accounted for 24.04 per cent of the total. This was the highest ratio ever recorded for this consumer. In 1936, with a reported consumption of 6,068,187 tons, the percentage was only 20.87 per cent of the total—a decline in percentage of 13.2 per cent.

The explanation, of course, lies in the fact that the improvement in consumption by some of the capital goods industries surpassed that of the automotive group in 1936.

Building construction, taking 13.87 per cent of the total, held second place among consumers by a comfortable margin. The railroads, staging the most impressive gains of any consuming classification, advanced from fourth place with 7.75 per cent in 1935 to third place with 11.33 per cent in 1936.

Containers, which graced third position with a percentage of 9.30 in 1935, edged downward to fourth place with 8.44 per cent in 1936. "Oil, gas and water" accounted for 5.33 per cent and ranked fifth. Machinery, with 4.96 per cent, occupied sixth place. Exports, agriculture, highways and bridges, shipbuilding and repair and mining, quarrying and lumbering followed in the order named.

IN ITS annual analyses of distribution, STEEL attempts to obtain reports from all companies engaged in rolling finished steel products. For 1936, returns from 82 companies were received. The reported distribution, shown in the table on page 337, accounts for 29,072,596 gross tons of finished rolled steel.

Steel ingot production in 1936 is estimated at 47,876,700 gross tons. Adopting the estimated ingot yield of 67.3 per cent used by the American Iron and Steel institute and applying it to the estimated ingot production, the yield of finished steel would be 32,221,019 tons. However, the institute includes as finished products certain items such as skelp, tube rounds, billets, etc., which STEEL does not recognize as "finished rolled steel" in its analysis. Therefore a further slight conversion loss should be subtracted from the 32,221,019 tons to arrive at the total for the finished items included in STEEL's classification.

Obviously the difference between the 32,221,019 tons and the 29,072,596 reported to STEEL is made up of two factors; first, the conversion loss mentioned, and secondly, the tonnage distributed by companies from which STEEL was unable to obtain reports. It is estimated that the reports received account for about 93 per cent of the finished rolled steel.

The table at the bottom of page 336 is calculated from the large table on page 337. The table at the top of page 336 shows the ratios of consumption of main groups for every year since 1922, when this series of statistics was inaugurated by *Iron Trade Review*, predecessor of STEEL.

PERHAPS the most significant factor in the 1936 figures is the strong comeback of the railroads as consumers. The improvement is marked, not only in consumption for cars and locomotives, but also in that for track materials and for buildings and bridges.

In 1936 a reported tonnage of 1,398,428 went for power and rolling stock, as against only 565,042 tons in 1935. This is by far the greatest increase found in any item of railroad purchasing in 1936. Consumption for track construction and repair was 1,659,627 tons in 1936, compared with 947,124 tons in the previous year. Steel for railroad buildings and bridges amounted to 235,271 tons in 1936 and 100,049 in 1935. The spectacular increase in steel for cars is the most tangible sign that has appeared of revival in capital goods.

While dropping from third to fourth place in rank as a consumer in 1936, the container classification actually increased its tonnage. It is credited with a consumption of 2,452,237 tons in 1936 compared with 1,935,276 in 1935. This gain of 516,961 tons or 27 per cent was accounted for by increased consumption of plates, tin plate, and sheets.

CONSUMPTION of finished rolled steel for "machinery, tools, equipment (including electrical)" will bear watching. In 1936 the steel consumed by this group amounted to 4.96 per cent of the total, the highest percentage recorded for this classifica-

te consumption

Ga harply

tion in the 15 years STEEL has been compiling consumption figures. Probably welding has had something to do with this ascendency. Consumption of plates and shapes is up appreciably. A question, the answer for which is not readily apparent, is raised by the fact that in 1936 the greatest tonnage for the machinery classification was for sheets instead of bars. Of course, electrical sheets fall in this consuming group, but that may not furnish the complete explanation.

No significant changes occurred in the minor consuming groups. Exports, agriculture, "shipbuilding and repair," and "mining, quarrying and lumbering" each accounted for percentages that do not vary

Consumption Ratios of Main Groups in Percentages

	1936	1935	1934	1933	1932	1931	1930	1929	1928	1927	1926	1925	1924	1923	1922
Automotive...	20.87	24.04	20.87	20.95	18.15	14.78	14.10	17.57	17.76	13.34	15.09	14.60	11.37	10.59	8.98
Buildings.....	13.87	13.01	12.70	12.18	16.38	16.80	17.80	14.70	15.22	14.89	13.10	15.26	14.44	13.53	11.84
Railroads.....	11.33	7.75	12.96	8.04	9.09	14.65	16.95	18.44	17.02	20.37	22.81	22.26	27.54	31.02	24.96
Containers....	8.44	9.30	8.68	12.25	10.79	7.90	5.77	4.67	4.56	5.21	5.24	4.20	4.96	3.68	4.16
Oil, gas, water.	5.33	4.29	4.97	4.88	5.50	9.75	9.48	9.01	7.72	8.90	9.29	8.03	8.43	10.60	14.84
Machinery....	4.96	4.37	3.65	3.63	3.39	3.37	3.80	3.81	3.48	2.79	2.65	2.69	3.69	2.63	2.83
Exports.....	3.79	3.85	5.29	3.61	3.31	4.10	4.34	4.83	5.52	5.39	5.29	4.47	5.89	6.22	7.82
Agriculture....	3.57	4.74	2.42	3.01	2.76	3.56	4.51	5.27	6.34	4.42	2.70	3.02	3.54	2.34	2.47
Jobbers.....	14.13	14.43	14.02	14.91	16.12	12.68	12.21	11.05	10.78	12.82	10.52	....	....	....	....
All other.....	13.71	14.22	14.44	16.54	14.51	12.41	11.04	10.65	11.60	11.87	13.31	25.47	20.14	19.39	22.10

noticeably from those of previous years. Shipbuilding and repair and exports undoubtedly are due for increased percentages, possibly in 1937.

The percentage of finished steel distributed through jobbers clings persistently to the 14 per cent bracket, in which it has been lodged for four consecutive years. The distribution under "miscellaneous" is down to 10.56 per cent, the lowest since this series of statistics was inaugurated.

IN VIEW of the billions of dollars spent by the government in relief work, it would be expected that the figures on the distribution of steel would reflect this influence noticeably. Most of the federal expenditures which went into projects involving the use of steel was for bridges, highways and public buildings. Therefore, if this huge disbursement of federal funds is to figure in the distribution figures, its effect should be noticeable in Classification 2a "Erection materials, framework, trim, etc. for buildings," and 3 "Highways and highway bridges."

Undoubtedly government aid in building helped to increase steel consumption under Classification 2a. The tonnage for erection materials in 1936 was 2,409,778, compared with 1,519,144 in 1935. This is an increase of 58.5 per cent. Furnishings, such as furniture, stoves, refrigerators, etc., meanwhile accounted for an increase of only 28.6 per cent in steel consumption. Moreover, it is well known that the demand for stoves, refrigerators, washing machines, etc., was brisk in 1936. The mere fact that steel consumption for erection materials, tirm, etc., gained by a considerably greater margin than that for furnishings seems to indicate that part of the building construction resulted from artificial stimulation—obviously government finance.

As for highways and bridges, steel consumption in 1936 was 499,590 tons, compared with 296,747 in 1935. Since federal funds were used liberally in both years, the figures are not significant. Certainly the expenditures do not appear to have lifted the consumption appreciably above the levels of years when local governments carried a heavy portion of the expense of highway construction.

WHILE the totals reported for each finished steel product fall somewhat short of the actual production figures which will be compiled by the American Iron and Steel institute, they serve to indicate the substantial gains in output over that of 1935.

The reported distribution of rails is up 69.5 per cent, of track accessories, up 64.9 per cent; plates, 68.0 per cent; structural shapes, 78.1 per cent; bars,

Distribution of Steel in Per Cent to Consuming Groups

	Rails, heavy and light	Angle bars, steel ties and other track accessories	Plates	Structural shapes over 3 inch	Bars, except concrete bars, and shapes under 3 inch	Concrete bars	Black plate for tinning	All other black plate and sheets except galv. sheets	Galvanized sheets	Strip steel	Tubing and pipe	Wire products	All other finished steel products
1—Railroads													
a Cars and locomotives	....	2.31	21.41	9.66	5.32	....	0.02	2.35	2.25	1.40	0.87	1.37	33.74
b Track construction and repair	89.85	86.88	0.61	0.01	0.76	0.27	....	0.45	0.29	0.08	0.14	0.34	3.75
c Buildings and bridges	0.40	0.25	2.22	5.08	0.74	1.26	....	0.15	0.25	0.08	0.10	0.24	0.51
2—Buildings													
a Erection materials, framework, trim, etc.	0.04	....	14.34	49.30	4.94	43.22	0.12	2.93	4.26	1.83	0.79	4.77	8.57
b Furnishings, furniture, stoves, refrigerators, etc.	....	....	1.25	0.45	1.80	....	0.74	12.43	4.06	3.70	0.27	5.24	1.62
c Other miscellaneous products for buildings	....	....	2.40	0.31	1.22	0.08	0.36	2.32	7.38	1.41	3.16	0.46	0.59
3—Highways and highway bridges	....	....	0.96	2.50	0.46	18.20	....	0.32	8.69	1.36	0.05	4.02	0.55
4—Automotive	0.01	0.01	3.71	0.97	35.79	0.07	0.36	41.62	0.96	57.85	1.07	5.76	2.11
5—Oil, gas and water	0.01	0.13	6.21	1.72	0.59	1.07	1.86	2.24	0.44	0.02	42.63	0.57	2.03
6—Mining, quarrying, lumbering	4.42	3.59	1.30	0.75	0.49	0.51	....	0.16	0.24	0.09	0.13	0.48	1.81
7—Agricultural													
a Implements	0.01	....	2.02	1.73	9.29	0.03	....	1.49	2.04	3.19	0.18	2.93	0.63
b Other agricultural uses	....	....	0.48	0.05	0.08	0.96	0.02	0.43	2.02	0.55	0.10	7.35	2.56
8—Shipbuilding and repair	0.01	0.01	6.71	1.68	0.50	0.02	0.02	0.07	0.12	0.02	0.11	0.08	1.01
9—Machinery, tools, equipment (including electrical)	0.14	0.03	7.15	5.05	8.67	1.03	0.12	7.03	1.14	4.38	4.18	2.94	8.68
10—Food and packing industry (all containers)	....	....	5.11	0.03	0.12	....	78.99	7.35	1.76	2.95	....	1.38	0.11
11—Exports	2.34	1.45	5.50	3.38	1.12	2.75	13.83	2.93	6.25	2.14	2.30	4.64	2.75
12—Miscellaneous	1.68	2.53	10.43	4.19	18.76	6.69	2.16	8.44	7.64	15.50	6.48	19.51	22.22
Jobbers	1.09	2.81	8.19	13.14	9.35	23.84	1.39	7.29	50.21	3.45	37.44	37.92	6.76
Grand totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

29.9 per cent; concrete bars, 78.0 per cent; black plate for tinning, 19.8 per cent; all sheets except galvanized, 52.9 per cent; galvanized sheets, 28.4 per cent; strip steel, 2.5 per cent; tubing and pipe, 70.8 per cent; wire products, 15.2 per cent and all other products, 87.6 per cent.

It will be noted that with few exceptions the largest gains are in the products which were hit hard-

per cent of the total tonnage of steel reported. In 1936 the reported tonnage of these products represented 42.3 per cent of the total.

Thus it is evident that 1936 witnessed the beginning of a swing back to a more normally distributed demand. A continuance of the revival of activity resulting from the authorization of capital expenditures, which was noticeable in the final

Distribution of Steel in Gross Tons to Consuming Groups

Based on 1936 Returns from 82 Operating Companies

	Rails, heavy and light	Angle bars, steel ties and other track accessories	Plates	Structural shapes over 3 inch	Bars, except concrete bars, and shapes under 3 inch	Concrete bars	Black plate for tinning	All other black plate and sheets except galv. sheets
1—Railroads								
a Cars and locomotives	.....	12,391	496,809	208,235	233,634	28	398	133,120
b Track construction and repair	1,080,425	465,978	14,107	238	33,481	2,142	.....	25,507
c Buildings and bridges	4,872	1,345	51,600	109,657	32,575	10,109	100	8,590
2—Buildings								
a Erection materials, framework, trim, etc	454	26	332,818	1,063,158	217,008	347,195	2,580	165,937
b Furnishings, furniture, stoves, refrigerators, etc	.....	.....	29,022	9,674	79,106	.....	16,424	704,623
c Other miscellaneous products for buildings	.....	2	55,690	6,748	53,500	648	8,064	131,678
3—Highways and highway bridges	.....	.....	22,281	53,887	20,270	146,242	.....	18,397
4—Automotive	146	43	86,008	20,813	1,571,999	546	8,032	2,359,796
5—Oil, gas and water	85	700	143,988	37,026	26,028	8,595	41,677	127,170
6—Mining, quarrying, lumbering	53,130	19,232	30,061	16,143	21,666	4,093	32	9,175
7—Agricultural								
a Implements	132	16	46,786	37,242	407,995	269	102	84,498
b Other agricultural uses	.....	.....	11,035	1,178	3,626	7,712	538	24,517
8—Shipbuilding and repair	70	70	155,800	36,333	22,034	136	557	4,166
9—Machinery, tools, equipment (including electrical)	1,679	160	166,015	108,894	380,606	8,242	2,623	398,734
10—Food and packing industry (all containers)	.....	.....	118,646	718	4,977	.....	1,765,745	416,526
11—Exports	28,089	7,787	127,733	72,997	49,164	22,059	309,217	166,033
12—Miscellaneous	20,185	13,542	242,082	90,413	823,814	53,739	48,241	478,481
Totals	1,189,267	521,292	2,130,481	1,873,354	3,981,483	611,755	2,204,330	5,256,948
Jobbers	13,133	15,044	189,986	283,305	410,745	191,511	31,027	413,352
Grand totals	1,202,400	536,336	2,320,467	2,156,659	4,392,228	803,266	2,235,357	5,670,300

	Galvanized sheets	Strip steel	Tubing and pipe	Wire products	All other finished steel products	Grand totals	Per cent of total
1—Railroads							
a Cars and locomotives	27,313	44,591	23,094	29,293	189,522	1,398,428	4.81
b Track construction and repair	3,489	2,441	3,622	7,149	21,048	1,659,627	5.71
c Buildings and bridges	2,984	2,639	2,781	5,145	2,874	235,271	0.81
2—Buildings							
a Erection materials, framework, trim, etc	51,556	58,279	20,984	101,637	48,146	2,409,778	8.29
b Furnishings, furniture, stoves, refrigerators, etc	49,228	118,266	7,190	111,661	9,076	1,134,270	3.90
c Other miscellaneous products for buildings	89,347	45,011	83,958	9,770	3,297	487,713	1.68
3—Highways and highway bridges	105,198	43,336	1,351	85,556	3,072	499,590	1.72
4—Automotive	11,644	1,845,998	28,473	122,818	11,871	6,068,187	20.87
5—Oil, gas and water	5,295	511	1,134,091	12,084	11,403	1,548,653	5.33
6—Mining, quarrying, lumbering	2,962	2,752	3,570	10,232	10,154	183,202	0.63
7—Agricultural							
a Implements	24,686	101,723	4,794	62,502	3,521	774,266	2.66
b Other agricultural uses	24,489	17,697	2,567	156,695	14,399	264,453	0.91
8—Shipbuilding and repair	1,414	793	2,829	1,744	5,698	231,644	0.80
9—Machinery, tools, equipment (including electrical)	13,848	139,911	111,135	62,733	48,773	1,443,353	4.96
10—Food and packing industry (all containers)	21,345	94,183	110	29,354	633	2,452,237	8.44
11—Exports	75,756	68,452	61,283	98,903	15,464	1,102,937	3.79
12—Miscellaneous	92,476	494,567	172,322	415,773	124,855	3,070,490	10.56
Totals	603,030	3,081,150	1,664,154	1,323,049	523,806	24,964,099	85.87
Jobbers	608,063	110,051	996,163	808,127	37,990	4,108,497	14.13
Grand totals	1,211,093	3,191,201	2,660,317	2,131,176	561,796	29,072,596	100.00

est during the depression, notably rails, plates and structural shapes. On the other hand, two products—strip and tin plate—which suffered less severely during the lean years, show only moderate gains in 1936.

Obviously the distribution of tonnage among the various finished steel products was better balanced in 1936 than in 1935. For instance, in the former year, the light flat rolled products, consisting of tin plate, sheets and strip steel, accounted for 46.2

months of 1936, will help further to restore a better balance.

A true perspective of the normal post-depression distribution of demand will not be possible until the building construction industry resumes its rightful place in the nation's economic picture. It will be interesting to see how an active building market will affect not only the demand for the traditional items of plates, structural shapes and bars, but also the products of the continuous mills—sheets and strip.

Use of Alloy Steel, by Consuming Industry, 1929-1936

	Percentage of Consumption by Groups								Gross Tons Reported
	1929	1930	1931	1932	1933	1934	1935	1936	1936
Automotive	61.40	62.23	72.67	77.64	68.28	53.31	72.22	59.78	412,331
Machine tools	6.34	8.95	6.17	3.54	3.57	4.88	4.47	6.57	45,301
Railroads	1.02	2.66	1.83	1.92	0.92	4.11	2.30	6.96	48,014
Agricultural	4.05	5.94	3.30	1.69	2.07	2.42	2.87	3.03	20,870
Construction	3.72	1.00	1.09	0.68	0.66	1.55	0.94	0.45	3,095
Shipbuilding	0.22	0.79	0.52	0.42	0.47	1.21	0.39	0.44	3,067
Oil industry	4.07	4.73	1.16	0.82	1.96	1.52	1.77	1.07	7,395
Exports	1.38	1.16	0.88	0.43	0.29	0.58	0.58	1.00	6,914
Miscellaneous	17.80	12.54	12.38	12.86	21.78	30.42	14.46	20.70	142,794
Totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	689,781

Distribution of Alloy Steel Shows Broader Use by Railroads, Machinery Industries

INTRODUCTION of new alloys in recent years is tending to broaden the distribution of alloy steel products. Analysis of reports received by STEEL from a majority of the most important producers shows that in 1936 a definite trend away from the usual supremacy of the automotive industry in the consumption of alloy steel was apparent while the reduction in the percentage of reported tonnage consumed by the motor car industry in 1936 is moderate, it probably is indicative of a trend that will gain strength in 1937.

According to reports covering 689,781 gross tons of finished forms of alloy steel, 59.78 per cent went to the automotive consuming group, compared with an average of 66.82 in the previous seven years. At the same time, consumption by the machine tool, railroads and agricultural classifications was noticeably heavier. In the case of machine tools and railroads, the percentages of consumption in 1936 were the highest recorded in this series of statistics.

The railroads accounted for 6.96 per cent of the total tonnage reported, thus establishing them in second place among consuming groups. Machine tools, accounting for 6.57 per cent of the total, closely behind the railroads, are in third place. Agriculture, the oil industry, exports, construction and shipbuilding follow in the order named.

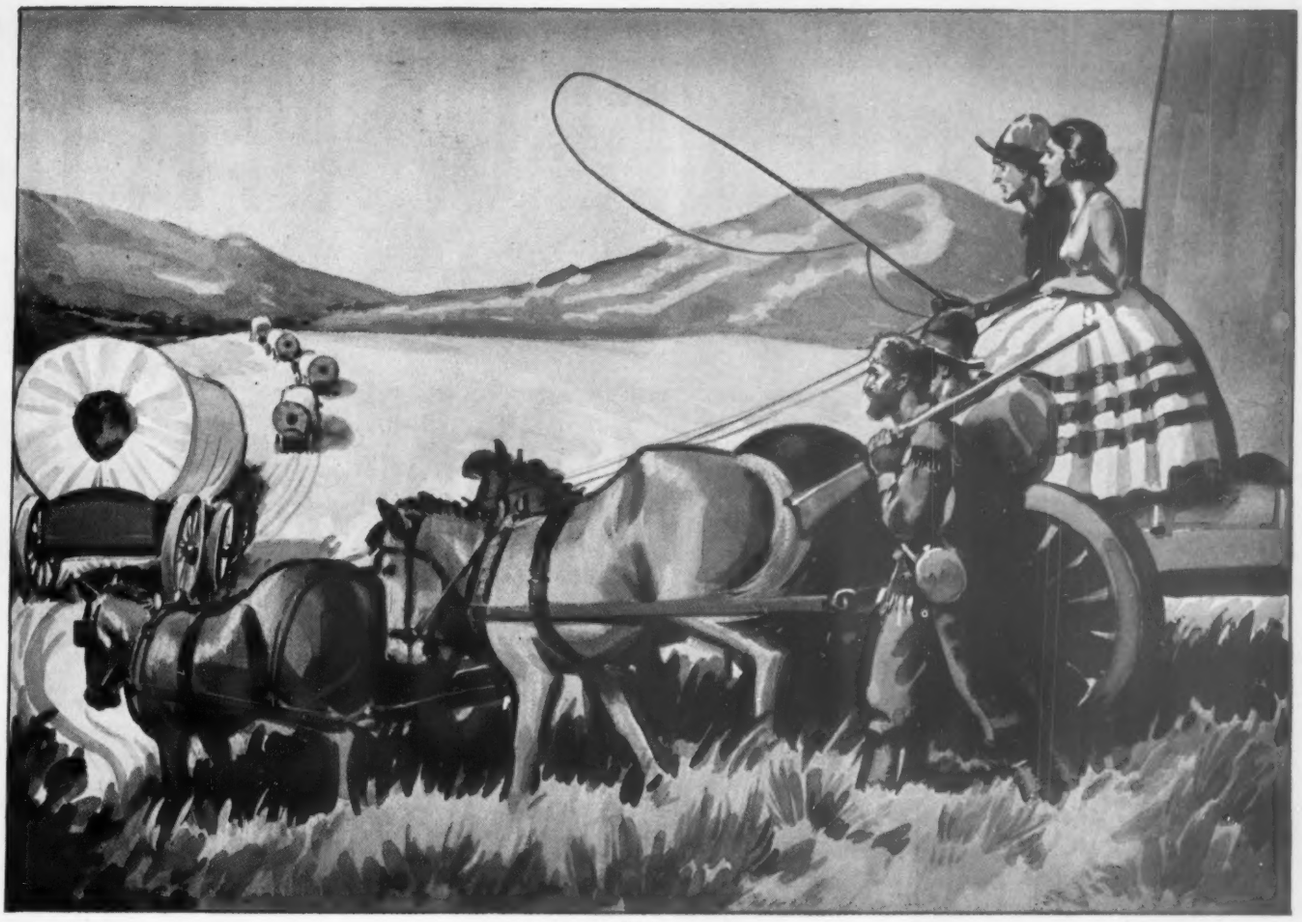
An overwhelming portion of alloy steel production is distributed in the form of hot rolled bars. Of the 689,781 tons reported in 1936, 533,310 tons or 77.32 per cent constituted alloy steel in this form. Increases are noted for some products, notably hot rolled strip, plates, shapes and sheets.

Unfortunately these figures must be considered as indicative rather than conclusive, because the returns are not yet sufficiently representative of the alloy steel industry. It is believed that figures from some of the companies which have not reported would tend to show greater diversity in distribution, thus reducing the percentage attributed to the automotive industry.

Undoubtedly the availability of alloy steel in cheaper analyses is tending to stimulate consumption in the heavier industries. Alloy steel for structural use in railroad cars, buses and certain stationary structures is gaining ground. This tendency is reflected in the distribution figures for 1936, shown herewith.

Use of Alloy Steel, by Finished Form, 1929-1936

	Percentage of Consumption by Products								Gross Tons Reported
	1929	1930	1931	1932	1933	1934	1935	1936	1936
Hot rolled bars	61.87	70.50	54.48	77.28	69.81	68.73	84.62	77.32	533,310
Cold drawn bars	11.43	5 32	25.65	11.68	19.05	14.99	4.32	2.54	17,550
Sheets	11.03	0.94	0.69	1.14	1.29	10.20	2.03	3.41	23,537
Plates	1.04	3.05	1.95	0.65	0.59	1.28	0.78	1.76	12,159
Pipe and tubes	6 33	8.84	8.60	4.80	3.57	1.75	0.78	1.11	7,641
Wire	0.05	0.03	0.06	0.28	0.33	0.25	1.15	1.57	10,790
Structural shapes	0.12	0.42	0.07	0.12	0.01	0.19	0.31	1.73	11,949
Hot rolled strip	4.43	3.86	1.31	0.66	2.88	0.49	5.01	6.91	47,678
Cold rolled strip	0.09	0.06	0.04	0.43	0.51	0.35	0.38	0.46	3,153
Tool steel	1.36	0.80	2.03	1.07	0.48	1.60	0.42	2.88	19,860
Forgings	2.25	6.13	5.12	1.89	1.48	0.17	0.20	0.31	2,154
Totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	689,781



Pioneers

The early history of many American industrial institutions, and likewise Link-Belt's, bristles with the undaunted courage and spirit of the founders. Today, following the trails they blazed, and, with the greater advancement which our civilization has brought us, we continue on to greater heights—constantly respecting and admiring those whose vision pointed the way.

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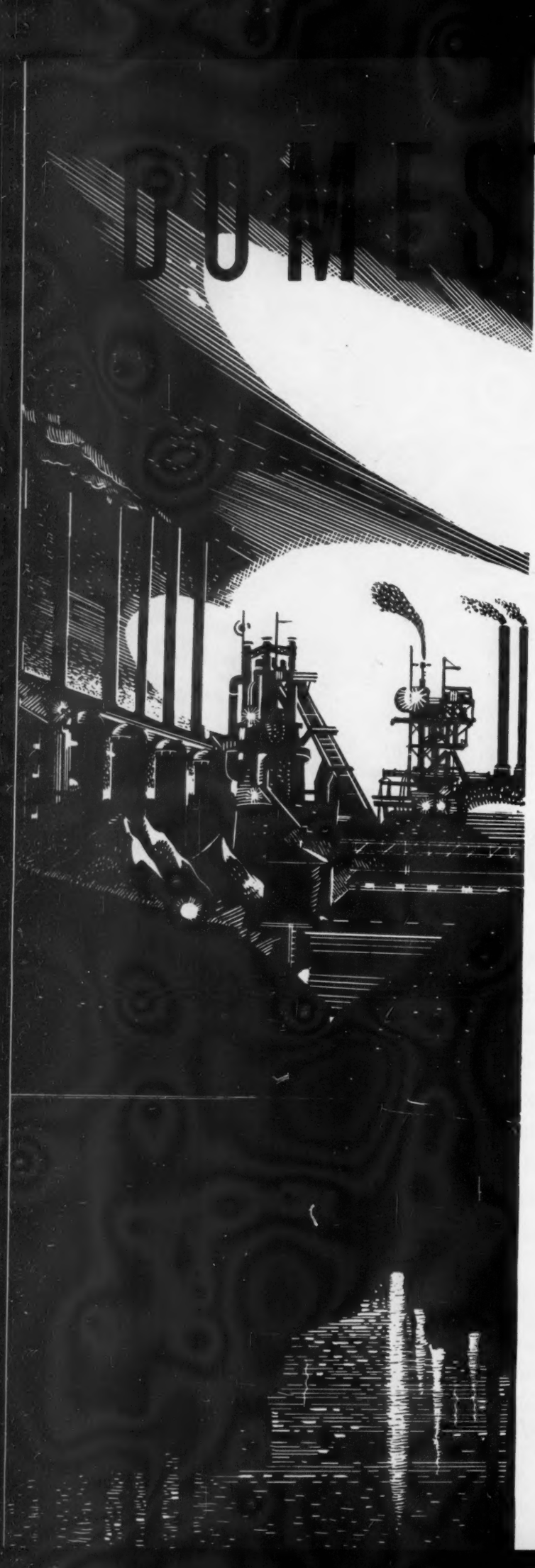


DOMESTIC MARKET AND PRICES

Iron and Steel Trade Cheered by Upward Trend in Prices, Sales

STRONG upward surge in steel buying was recorded in 1936. Marked for the first time since the depression with active demand from heavy industries, the rise brought ingots and castings, some 48,800,000 tons, to the highest point since 1929, when the all-time record of 56,433,473 tons was established. And it boomed pig iron production, for the second consecutive year, with a gain of over 32 per cent.

Demand for lighter products, bulwark of business in recent lean years, showed further increase, but as the year progressed the heavier products sidled into the picture. This became particularly noticeable as the summer advanced, and production, despite the low ebb of automotive buying and seasonal influences not only held but expanded. With fall this trend continued, the best railroad buying in several years combining with heavy protective covering and delayed purchases by the automotive industry to give 1936 a whirlwind finish.

Not only a new peak since 1929, estimated ingot production last year ranked as the third highest on record, being surpassed, in addition to 1929, by only 1928 production total. Against the 1935 output of

ET SUMMARY

RCE HISTORY

33,517,985 tons, it represented a gain of almost 43 per cent.

Steelworks operations last year averaged more than 67 per cent, against 48.54 in 1935, 19.7 in 1932, 63 in 1930 and 88.8 in 1929.

Estimated pig iron production in 1936 of 31,078,000 tons fell nearly a half million tons short of 1930, and more than 11,000,000 tons under the peak year 1929.

Notable is the fact that substantial gains were made last year despite the shackles of an election year, tax and other legislative enactments which gave business leaders considerable concern. Particularly gratifying to steel producers was the solid character of much of the buying, with greater attention not only given to long pent-up requirements, but to future expansion and development.

CONFRONTED with fast mounting costs, including the first major wage increase of the past year on Nov. 16, an increase of around 10 per cent, steel producers late in November announced the sharpest and broadest price advance in recent years, the new prices becoming effective in most instances on first quarter tonnage this year.

These announcements climaxed a year of uneven, but slowly advancing prices, a year which started inauspiciously with an almost demoralized price situation in sheets and strip. The first move was the inauguration of a quantity differential system to rectify this situation, efforts reaching fruition toward the close of the first quarter.

The next major price development came at the beginning of the third quarter with a $2 advance on plates, shapes, bars, sheets and semifinished, and a $3 increase in railroad fastenings, to be followed up with a $2 advance in semifinished at the beginning of the third quarter.

Scrap prices made substantial gains and quotations on beehive coke advanced sharply from a low in July, when a large transaction was reported at $3.25, ovens, to $4 and $4.25 on standard furnace grades at the end of the year. STEEL's iron and steel composite, which includes scrap, rose slowly from $33.31 at the beginning of the year to $35.33 on Dec. 26. This naturally did not take into account the advances named for first quarter this year.

AUTOMOBILE industry's estimated output of 4,487,000 cars and trucks in 1936 exceeded the 4,119,811 total for the previous year, and maintained the industry as the largest single buyer of steel.

Increased farm income provided larger markets for wire products and galvanized sheets and for steel for implements and tractors. Farm equipment production was the heaviest in six or seven years, despite the drought. Sale of wire products for farm consumption showed an increase over the preceding year.

More diversified markets for containers, with beer cans a still growing factor, combined with a good demand for cans for food packing, to sustain tin plate schedules at a high rate throughout almost the entire year.

While the new schedules on tin plate appeared on the surface as a reduction of 40 cents per base box, actually they were a reaffirmation since in the schedules adopted for 1937 the 7½ per cent discount from base formerly allowed was eliminated. This change, it was said, was made to conform with provisions of the Robinson-Patman act.

ONE of the most gratifying developments to the industry was the sharp improvement in railroad buying. The price advance Dec. 1 is estimated to have stimulated the release of close to 700,000 tons of rails in November. Total rail purchases for last year are placed at approximately 1,500,000 tons, as compared with 1,873,233 tons in 1930 and 2,722,138 in 1929.

Domestic freight car purchases, estimated at more

than 60,000 cars, jumped from 19,308 in 1935 and were the heaviest since 1929, when 106,105 cars were bought. Passenger car orders, involving 250 cars up to near the close of the year, were four times greater than in the year before, with light-weight streamlined units coming through test periods successfully, as indicated by new and repeat orders for equipment.

More than 400 steam locomotives, approximately five times the number in 1935, were placed last year. Apparently, the record will fall just short of the 1930 total.

Ship work started off 1936 promisingly with the placing of a number of tankers, a movement featured by the award of eight by the Standard Vacuum Transportation Co., New York, in July. Interestingly, the gross tonnage of these ships, 103,000 tons, exceeded by 12,000 tons that of all craft under construction in American yards in the second quarter. Tanker work, involving more than 20 ships, was supplemented during the year by a large number of barges and other craft of generally lighter descriptions.

Structural activity was the best since at least 1931, with bridge work constituting about 50 per cent of the total. Contributing to a better year in bridge work were a large number of flood replacements in several eastern areas, particularly Pennsylvania.

Government financed work expanded, and accounted for 50 per cent of the year's structural business. The largest work of private character was plant construction, with urban activity still lagging, due in a large measure to continued handicaps in financing. There was a dearth of large office and apartment construction.

All in all, however, there was a gain in heavy tonnage, such as plant additions, bridges and highway developments, as indicated by STEEL's compilation into December of jobs totaling 100 tons and over. This record showed a total of 1,131,728 tons, against 897,319 tons in the corresponding period in 1935.

FABRICATED material prices were unsettled, although they showed some strength as the year closed, with plain material prices and wages going higher. Weakness in reinforcing bar prices also was in evidence throughout the greater part of the year.

Parenthetically, weakness in reinforcing bar prices was rivaled by nails, the market on which during the first eight or nine months of the year was particularly depressed along the eastern seaboard by importations of cheap material from abroad. Prices sagged from 2.40c, Pittsburgh, to 1.90c, with headway toward a more stable market being made as the year ended. Prices announced for first quarter this year set the market officially at 2.25c, Pittsburgh.

Interestingly, the depressing influence of imports on nails was offset late in the year by fast expanding foreign demand for wire, which shot export prices on some descriptions up $6 and $8 a ton. This bulge in export demand was largely from South America, due to drying up of European supplies.

Reflecting improved business, the bolt and nut industry, with annual capacity of about 1,000,000 tons, operated last year at about 55 per cent, against 36 per cent the year before. Possibly the high point was reached in October, when production averaged more than 60 per cent. Prices followed the general upward trend of the steel market, but not infrequently showed considerable weakness.

Machinery sales, and also material handling equipment, reflected extensive rehabilitation programs under way throughout the industry, and the heavy retooling requirements of automobile builders. Sales ran 25 to 30 per cent ahead of 1935. However, the surplus tax law, which makes no provisions for deductions in the case of capital expenditures, undoubtedly held up considerable business.

BUOYANCY was noted in scrap throughout the greater part of the year. At Pittsburgh the sharpest advance in peacetime history began late in June, when by weekly stages the market advanced more than $5 a ton by early October. At Chicago the movement of heavy melting steel reached the highest level since early in 1929 and with that exception was at a peak for the past 11 years. Many large accumulations of five years' holding and longer, were sold. Incidentally, lake shippers of scrap enjoyed one of the most active years in their experience.

In the East a lagging domestic demand in the first half was bolstered by continued heavy exports. However, as domestic prices throughout the country began to stiffen foreign buyers started to withdraw, and when France, Italy and several other European countries debased their currency in the fall this tendency became more pronounced.

Domestic scrap prices, following a strong rise for a number of weeks, eased off in October, only to regain in strength late in November and continue strong throughout the remainder of the year.

While pig iron prices were stable throughout practically 11 months of the year, demand broadened considerably, especially in the last half. In the Pittsburgh district most sellers, as early as September, were sold out for the balance of the year and many steelworks interests began to withdraw from the merchant iron business. At Chicago, pig iron sales were the best in six years, and a comparable record was made in the East.

Price advances in November, which were the first since a year ago that time, contributed to the heavy movement of iron as the year ended. The principal consumers included manufacturers of heating and sanitary equipment, railroads, farm implement and railroad equipment manufacturers, machine tool builders and producers of automobile castings.

Pig iron imports in the East, substantial in recent years, began to drop off in the fall. This was attributable in part to heavy demand abroad, which, along with advancing raw material prices sent quotations on imported iron here up sharply.

Movement of ferromanganese was on a constantly increasing scale throughout the year, in line with expanding steel production. Prices, however, were unchanged until Dec. 9, when an advance of $5 was announced. This brought the duty paid price up to $80. Prior to that the price was $10 a ton down from the preceding year's close, a reduction attributable to a slash in import duties, effective Jan. 1 of that year.

ORE movement on the Great Lakes was the heaviest in six years, with 44,822,023 gross tons brought down from upper lake ports during the season. Foreign ore tonnage also showed improvement, with increasing scarcity resulting in a sharp advance in prices as the year ended. Scarcity of ore abroad was attributable not only to increasing de-

(*Please turn to Page* 411)

Monthly Price Averages for Ten Years

Price averages for years prior to 1927 may be found in STEEL for Jan. 7, 1935

Ores and Alloys

Per Gross Ton

Iron Ore Prices at Date of Buying Movement, delivered lower lake ports

Season	Date buying movement	Old range Bessemer Ton	Old range Bessemer Cents per unit	Old range Nonbessemer Ton	Old range Nonbessemer Cents per unit	Mesabi Bessemer Ton	Mesabi Bessemer Cents per unit	Mesabi Nonbessemer Ton	Mesabi Nonbessemer Cents per unit	Iron prices, Valley Bessemer	Iron prices, Valley No. 2 Foundry
1936	Apr. 3, 1936	$4.80	9.320	$4.65	9.029	$4.65	9.029	$4.50	8.738	$20.00	$19.50
1935	May 4, 1935	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	19.00	18.50
1934	May 19, 1934	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	19.00	18.50
1933	June 12, 1933	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	16.00	15.50
1932	June 3, 1932	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	14.50	14.50
1931	Apr. 15, 1931	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	17.00	17.00
1930	Apr. 1, 1930	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	19.00	18.50
1929	Mar. 22, 1929	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	18.50	18.00
1928	Apr. 16, 1928	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	17.50	17.25
1927	Apr. 8, 1927	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	19.50	18.50

Manganese Ore

Dollars Per Gross Ton, Duty Paid, Northern Atlantic Ports, on Basis of 50 Per Cent Ore

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936*	$18.60	$18.60	$18.60	$18.60	$18.60	$18.60	$18.60	$18.60	$18.60	$19.10	$19.10	$20.60
1935	23.70	23.70	23.70	23.70	23.70	23.70	23.70	23.70	23.70	23.70	23.70	23.70
1934	21.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	23.20	23.70	23.70	23.70
1933	19.95	19.95	19.95	19.95	19.95	20.20	20.45	21.45	21.45	21.70	21.70	21.70
1932	22.70	22.70	22.70	22.70	21.70	21.70	21.70	21.70	21.20	21.20	21.20	20.70
1931	24.20	24.20	23.70	23.70	23.70	23.70	23.70	23.70	23.70	22.70	22.70	22.70
1930	29.95	24.70	24.70	24.70	24.70	24.70	24.70	24.20	24.20	24.20	24.20	24.20
1929	27.70	27.70	27.70	27.70	27.70	27.70	26.70	26.70	26.70	25.70	25.70	25.70
1928	30.20	30.20	30.20	30.20	30.20	30.20	30.20	30.20	30.20	30.20	29.20	29.20
1927	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70

*Effective Jan. 1, duty ½c per pound metallic content; $5.60 gross ton on 50 per cent ore.

Bessemer Ferrosilicon, 10 Per Cent

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$27.75	$27.75	$27.75	$27.75	$27.75	$27.75	$27.75	$27.75	$27.75	$27.75	$27.75	$29.00
1935	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75
1934	27.25	27.25	27.25	27.25	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75
1933	20.50	20.50	20.50	20.50	20.50	20.75	22.40	24.65	27.00	27.75	27.75	27.75
1932	23.00	22.00	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50
1931	25.00	25.00	25.00	25.00	25.00	25.00	25.00	24.00	23.00	23.00	23.00	23.00
1930	30.00	30.00	30.00	30.00	30.00	29.50	29.00	29.00	25.00	25.00	25.00	25.00
1929	31.00	31.00	31.00	31.00	31.00	31.00	31.00	30.20	30.00	30.00	30.00	30.00
1928	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
1927	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	33.50	32.00	30.00

Ferrosilicon, 50 Per Cent

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$77.50	$77.50	$77.50	$77.50	$69.50	$69.50	$69.50	$69.50	$69.50	$69.50	$69.50	$69.50
1935	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50
1934	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50
1933	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50
1932	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	76.30
1931	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	77.50
1930	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50
1929	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50
1928	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50
1927	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00

Spiegeleisen, 20 Per Cent

At Producers' Furnaces

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00
1935	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1934	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1933	24.00	24.00	24.00	24.00	24.00	24.00	27.00	27.00	27.00	27.00	27.00	27.00
1932	27.00	27.00	27.00	27.00	27.00	26.50	25.00	25.00	25.00	25.00	24.25	24.00
1931	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	27.00
1930	34.00	34.00	34.00	34.00	34.00	34.00	33.00	33.00	33.00	33.00	33.00	30.00
1929	34.00	34.00	34.00	34.00	34.00	34.00	34.00	33.20	33.50	34.00	34.00	34.00
1928	32.00	32.00	32.00	32.00	32.00	32.00	33.00	33.00	33.00	33.00	33.00	34.00
1927	37.00	37.00	37.00	37.00	35.50	34.80	34.00	33.35	33.00	30.15	30.00	31.00

Ferromanganese, 80 Per Cent, delivered Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$90.13	$80.13	$80.13	$80.13	$80.13	$80.13	$80.13	$80.13	$80.13	$80.13	$80.13	$85.13
1935	89.79	89.79	89.79	89.85	90.13	90.13	90.13	90.13	90.13	90.13	90.13	90.13
1934	90.24	90.24	90.24	90.24	90.24	90.00	89.79	89.79	89.79	89.79	89.79	89.79
1933	73.24	73.24	73.24	73.24	73.24	73.24	84.44	87.24	87.24	87.24	87.24	87.24
1932	79.85	80.24	20.24	80.24	80.24	74.99	73.24	73.24	73.24	73.24	73.24	73.24
1931	89.79	89.79	89.79	89.79	89.79	89.79	89.79	89.79	89.79	89.79	89.79	79.79
1930	104.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	93.25
1929	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	104.79
1928	104.79	104.79	104.79	104.79	108.19	109.79	109.79	109.79	109.79	109.79	109.79	109.79
1927	104.79	104.79	104.79	104.79	98.54	94.79	94.79	94.79	94.79	94.79	94.79	103.42

Duty of 1¾ cents per pound contained manganese became effective on ferromanganese Sept. 21, 1922.

Ferrotungsten

Per Pound of Metallic Tungsten Contained

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$1.35	$1.35	$1.35	$1.35	$1.35	$1.35	$1.30	$1.30	$1.30	$1.30	$1.30	$1.30
1935	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
1934	1.16	1.16	1.16	1.20	1.35	1.45	1.35	1.35	1.35	1.35	1.35	1.35
1933	0.94	0.94	0.94	0.94	0.94	0.94	0.96	1.04	1.02	1.10	1.16	1.16
1932	1.10	1.10	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
1931	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
1930	1.45	1.45	1.43	1.40	1.35	1.20	1.20	1.10	1.11	1.11	1.12	1.13
1929	1.04	1.04	1.09	1.30	1.32	1.36	1.38	1.43	1.45	1.45	1.45	1.47
1928	0.94	0.93	0.93	0'93	0.95	0.96	0.97	0.97	0.97	0.97	0.98	1.00
1927	1.05	1.05	1.01	1.00	0.93	0.98	0.96	0.94	0.92	0.92	0.92	0.95

Ferrochrome, 66-70 Per Cent

Per Pound of Metallic Chromium Contained

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00	$ 10.00	$10.00	$10.00	$10.00	$10.00
1935	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
1934	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
1933	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.60
1932	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	9.90
1931	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	10.25
1930	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1929	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1928	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1927	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50

Pig Iron

Per Gross Ton

Basic, Valley

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.25	$20.00
1935	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	19.00	19.00
1934	17.00	17.00	17.00	17.60	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
1933	14.00	14.00	14.00	14.00	14.40	15.00	15.60	16.00	17.00	17.00	17.00	17.00
1932	15.00	15.00	15.00	15.00	15.00	14.50	14.00	14.00	14.00	14.00	14.00	14.00
1931	17.00	16.75	16.75	17.00	17.00	17.00	17.00	17.00	17.00	16.60	15.00	15.00
1930	18.50	18.50	18.50	18.50	18.50	18.50	18.25	18.00	17.75	17.00	17.00	17.00
1929	17.50	17.50	17.60	18.00	18.30	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1928	17.00	17.00	17.00	16.75	16.20	15.80	15.95	16.00	16.10	16.85	17.70	17.50
1927	18.50	17.85	18.50	19.00	18.10	17.90	17.50	17.50	17.15	17.00	17.00	17.00

Bessemer, delivered Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$21.06	$21.81
1935	19.76	19.76	19.76	19.76	19.80	19.81	19.81	19.81	19.81	19.81	20.81	20.81
1934	19.26	19.26	19.26	19.56	19.76	19.76	19.76	19.76	19.76	19.76	19.76	19.76
1933	15.76	15.76	15.76	16.26	16.66	17.26	17.86	18.26	19.26	19.26	19.26	19.26
1932	17.26	16.96	16.76	16.76	16.15	15.95	15.76	15.76	15.76	15.76	15.76	15.76
1931	18.76	18.51	18.26	18.26	18.26	18.26	18.26	18.26	18.26	18.16	17.76	15.71
1930	20.76	20.76	20.76	20.76	20.76	20.76	20.46	20.26	24.13	19.36	18.63	18.76
1929	19.96	19.86	20.11	20.26	20.56	20.76	20.76	20.76	20.76	20.76	20.76	20.76
1928	19.26	19.26	19.21	19.26	19.26	18.76	18.76	18.76	18.86	19.11	19.96	20.01
1927	21.26	20.76	21.16	21.26	20.86	20.66	20.26	20.26	19.86	19.76	19.76	19.26

No. 2 Foundry, f.o.b. Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.75	$20.50
1935	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.75	19.50	19.50
1934	17.50	17.50	17.50	18.25	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1933	15.50	15.50	15.50	15.50	15.90	16.00	16.75	17.00	17.50	17.50	17.50	17.50
1932	16.50	16.50	16.50	16.00	15.60	16.00	15.50	15.50	15.50	15.50	15.50	15.50
1931	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.20	17.00	16.60
1930	20.00	20.00	19.50	19.40	19.00	18.40	17.90	17.50	17.50	17.50	17.50	17.50
1929	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1928	18.50	18.50	18.50	18.50	18.20	18.00	17.60	17.60	18.25	18.80	20.00	20.00
1927	20.90	20.25	20.00	20.00	20.00	20.00	20.00	19.50	19.50	18.75	18.50	18.50

No. 2 Foundry, f.o.b. Valley

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.75	$20.50
1935	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	19.50	19.50
1934	17.50	17.50	17.50	18.25	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1933	14.50	14.50	14.50	14.50	14.75	15.50	16.10	16.50	17.50	17.50	17.50	17.50
1932	15.50	15.50	15.00	15.00	14.80	14.50	14.50	14.50	14.50	14.50	14.50	14.50
1931	17.00	16.75	16.90	17.00	17.00	17.00	17.00	17.00	17.00	16.85	16.00	15.50
1930	18.50	18.50	18.50	18.50	18.50	17.63	18.00	18.00	17.75	17.20	17.00	17.00
1929	17.50	17.50	17.75	18.15	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1928	17.25	17.25	17.25	17.25	17.10	16.75	16.50	16.50	16.85	17.00	17.70	18.00
1927	18.43	18.06	18.37	18.50	18.50	18.20	17.50	17.50	17.50	17.50	17.45	17.25

No. 2X Foundry, delivered Philadelphia

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
1936	$21.68	$21.68	$21.68	$21.68	$21.68	$21.68	$21.68	$21.68	$21.68	$21.68	$21.93	$22.68
1935	20.63	20.63	20.63	20.63	20.68	20.68	20.68	20.68	20.68	20.68	21.68	21.68
1934	19.63	19.63	19.63	20.38	20.63	20.63	20.63	20.63	20.63	20.63	20.63	20.63
1933	13.76	13.76	13.76	14.51	15.91	16.76	17.28	17.88	18.63	18.63	18.63	19.63
1932	15.76	15.76	15.76	15.66	15.13	14.76	14.76	14.51	14.26	14.16	13.95	13.88
1931	18.26	18.26	18.26	18.26	17.76	17.76	17.76	17.51	17.01	16.01	16.01	15.76
1930	21.56	21.26	20.76	20.76	20.26	20.26	20.26	19.76	19.76	19.26	19.13	18.26
1929	22.26	22.01	22.26	22.26	22.76	22.76	22.76	22.26	22.26	22.26	22.26	21.76
1928	20.51	20.91	21.26	21.26	21.26	21.26	20.76	20.76	21.01	21.76	21.51	21.76
1927	22.76	22.26	22.26	22.26	22.26	22.01	21.51	21.26	21.01	20.66	20.51	20.26

No. 2X Foundry, f.o.b. Buffalo

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.75	$20.50
1935	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	19.50	19.50
1934	17.50	17.50	17.50	18.25	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1933	16.50	16.50	16.50	16.50	16.50	16.50	17.10	17.75	17.50	17.50	17.50	17.50
1932	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50
1931	18.00	18.00	18.00	18.00	17.60	17.50	17.50	17.50	17.50	17.50	17.50	17.50
1930	19.40	19.00	19.00	19.00	19.00	19.00	19.00	18.75	19.00	18.40	18.00	18.00
1929	19.00	19.00	19.25	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1928	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	18.00	19.00	19.00
1927	19.75	18.90	18.15	18.00	18.00	17.90	17.50	17.45	18.00	18.00	17.60	17.50

Southern No. 2, f.o.b. Birmingham

Local Delivery

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.84	$16.88
1935	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.75	15.50
1934	13.50	13.50	13.50	14.25	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50
1933	11.00	11.00	11.00	11.40	12.00	12.00	12.60	13.00	13.50	13.50	13.50	13.50
1932	12.00	11.20	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1931	14.00	13.00	13.00	13.06	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
1930	14.70	15.00	14.50	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
1929	16.50	16.50	16.00	15.50	15.50	15.25	14|00	14.00	14.00	14.00	14.00	14.00
1928	16.00	16.00	16.00	16.00	16.00	15.90	15.50	15.65	16.25	16.25	16.30	16.50
1927	18.50	18.00	18.00	18.00	18.00	18.00	17.43	17.25	17.25	17.25	16.00	16.00

Malleable, f.o.b. Valley

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.75	$20.50
1935	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	19.50	19.50
1934	17.50	17.50	17.50	18.10	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1933	14.50	14.50	14.50	14.50	14.90	15.50	16.10	16.50	17.50	17.50	17.50	17.50
1932	16.00	15.50	15.50	15.50	15.00	14.50	14.50	14.50	14.50	14.50	14.50	14.50
1931	17.50	17.25	17.00	17.00	17.00	17.00	17.00	17.00	17.00	16.90	16.50	16.00
1930	19.00	19.00	19.00	19.00	19.00	19.00	18.75	18.50	18.35	17.80	17.50	17.50
1929	18.00	18.00	18.10	18.50	18.80	19.00	19.00	19.00	19.00	19.00	19.00	19.00
1928	17.25	17.25	17.25	17.25	17.25	17.00	17.00	17.00	17.10	17.35	17.90	18.00
1927	18.50	18.10	18.40	18.50	18.50	18.25	17.50	17.50	17.50	17.50	17.50	17.25

Malleable, f.o.b. Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.75	$20.50
1935	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.75	19.50	19.50
1934	17.50	17.50	17.50	18.10	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1933	15.50	15.50	15.50	15.50	15.50	16.00	16.50	17.00	17.50	17.50	17.50	17.50
1932	16.50	16.50	16.50	16.00	16.60	16.00	15.50	15.50	15.50	15.50	15.50	15.50
1931	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.10	17.00	16.60
1930	20.00	20.00	19.50	19.40	19.00	18.40	17.90	17.50	17.50	17.50	17.50	17.00
1929	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1928	18.50	18.50	18.50	18.50	18.20	18.00	17.60	17.60	18.25	18.80	20.00	20.00
1927	20.90	20.25	20.00	20.00	20.00	20.00	20.00	19.50	19.50	18.75	18.50	18.50

Basic, delivered Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$21.06	$21.81
1935	19.76	19.76	19.76	19.76	19.81	19.81	19.81	19.81	19.81	19.81	20.81	20.81
1934	18.76	18.76	18.76	19.51	19.76	19.76	19.76	19.76	19.76	19.76	19.76	19.76
1933	13.50	13.50	13.50	14.19	15.99	18.19	16.79	17.20	17.76	17.76	17.76	18.76
1932	16.00	15.75	15.75	15.00	15.00	14.50	14.35	13.90	13.75	13.60	13.50	13.50
1931	17.25	17.25	17.25	17.25	17.00	17.00	16.75	16.75	16.00	16.00	16.00	16.00
1930	19.20	19.00	18.80	18.76	18.75	18.75	18.00	18.00	17.87	17.50	17.50	17.50
1929	20.15	20.50	20.25	20.25	20.50	20.25	19.85	19.85	19.85	19.75	19.75	19.75
1928	19.50	19.50	19.50	19.25	19.10	19.10	19.00	19.00	19.00	19.75	19.75	19.75
1927	21.25	21.00	21.00	20.90	20.75	20.75	20.50	19.75	19.75	19.50	19.50	19.25

Standard Low Phosphorus, delivered Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$25.13	$25.13	$25.13	$24.13	$25.13	$25.13	$25.13	$25.13	$25.13	$25.13	$25.38	$26.13
1935	24.63	24.63	24.63	24.63	24.68	24.68	24.68	24.68	24.68	24.68	24.68	24.68
1934	24.13	24.13	24.13	24.13	24.63	24.63	24.63	24.63	24.63	24.63	24.63	24.63
1933	20.75	20.50	20.50	20.50	21.68	22.00	22.80	23.50	23.13	23.13	23.13	24.13
1932	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76
1931	24.76	24.76	24.76	24.76	24.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76
1930	24.76	24.76	24.76	24.76	24.76	24.26	24.26	24.26	24.76	24.76	24.76	24.76
1929	24.26	24.26	24.26	24.26	24.26	24.26	24.26	24.26	24.76	24.76	24.76	24.76
1928	24.76	24.76	24.76	24.76	24.76	24.51	24.51	24.51	24.26	24.26	24.26	24.26
1927	25.76	25.76	25.76	25.76	25.76	25.76	25.76	25.26	25.26	25.26	24.76	24.76

No. 2X, f.o.b. Virginia Furnace

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1933	$17.75	$17.75	$17.75	$17.75	$17.75	$17.75	$17.75	Not offered after July				
1932	18.00	18.00	18.00	18.00	18.00	18.00	18.00	$17.75	$17.75	$17.75	$17.75	$17.75
1931	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.00	18.00	18.00
1930	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
1929	21.25	21.25	21.00	20.75	20.75	20.00	20.00	20.00	20.00	19.65	18.25	18.25
1928	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	21.25
1927	21.75	22.00	22.00	22.00	22.00	22.00	22.00	21.50	21.50	21.50	21.25	21.00

Lake Superior Charcoal, delivered Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$25.25	$25.25	$25.25	$25.25	$25.25	$25.25	$25.25	$25.25	$25.25	$25.25	$25.50	$26.25
1935	24.04	24.04	24.04	24.15	24.25	24.25	24.25	24.25	24.25	24.90	25.25	25.25
1934	23.54	23.54	23.54	23.66	24.04	24.04	24.04	24.04	24.04	24.04	24.04	24.04
1933	23.04	23.04	23.04	23.06	23.04	23.04	23.04	23.04	23.54	23.54	23.54	23.54
1932	22.29	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.04
1931	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	25.54	25.04	25.04	20.79
1930	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1929	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1928	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1927	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04

Semifinished Material

Per Gross Ton f.o.b.

Bessemer Billets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$29.00	$29.00	$28.40	$28.00	$28.00	$28.00	$30.00	$30.00	$30.00	$32.00	$32.00	$32.00
1935	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	28.50	29.00
1934	26.00	26.00	26.00	27.80	29.00	29.00	27.40	27.00	27.00	27.00	27.00	27.00
1933	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1932	27.50	27.00	27.00	27.00	27.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1931	30.00	30.00	30.00	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	33.00	34.25	34.00	34.50	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	33.00	33.00	33.00	33.00	33.00	32.50	32.25	32.00	32.00	32.75	33.00	33.00
1927	35.00	34.00	33.60	33.50	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00

Open-Hearth Billets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$29.00	$29.00	$28.40	$28.00	$28.00	$28.00	$30.00	$30.00	$30.00	$32.00	$32.00	$32.00
1935	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	28.50	29.00
1934	26.00	26.00	26.00	27.80	29.00	29.00	27.40	27.00	27.00	27.00	27.00	27.00
1933	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1932	27.50	27.00	27.00	27.00	27.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1931	30.00	30.00	30.00	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	33.00	34.25	34.00	34.50	36.00	36.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	33.00	33.00	33.00	33.00	33.00	32.50	32.25	32.00	32.00	32.75	33.00	33.00
1927	35.00	34.00	33.60	33.50	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00

Open-Hearth Sheet Bars, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$30.00	$30.00	$28.50	$28.00	$28.00	$28.00	$30.00	$30.00	$30.00	$32.00	$32.00	$32.00
1935	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	29.50	30.00
1934	26.00	26.00	26.00	28.40	30.00	30.00	28.40	28.00	28.00	28.00	28.00	28.00
1933	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1932	27.50	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1931	30.00	30.00	30.00	30.00	29.75	29.00	29.00	29.00	29.00	29.00	29.00	28.50
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	34.00	33.25	35.00	35.25	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	34.00	34.00	33.70	34.00	34.00	33.50	32.25	32.20	33.00	33.00	33.60	34.00
1927	36.00	35.00	34.00	33.75	33.75	33.50	33.50	33.50	33.90	34.00	34.00	34.00

Bessemer Sheet Bars, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$30.00	$30.00	$28.50	$28.00	$28.00	$28.00	$30.00	$30.00	$30.00	$32.00	$32.00	$32.00
1935	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	29.50	30.00
1934	26.00	26.00	26.00	28.40	30.00	30.00	28.40	28.00	28.00	28.00	28.00	28.00
1933	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1932	27.50	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1931	30.00	30.00	30.00	30.00	29.75	29.00	29.00	29.00	29.00	29.00	29.00	29.00
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	34.00	33.25	35.00	35.25	26.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	34.00	34.00	33.70	34.00	34.00	33.50	32.25	32.20	33.00	33.00	33.60	34.00
1927	36.00	35.00	34.00	33.75	33.75	33.50	33.50	33.50	33.90	34.00	34.00	34.00

Wire Rods, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$40.00	$40.00	$40.00	$40.00	$40.00	$38.80	$38.00	$38.00	$38.00	$40.00	$40.00	$40.00
1935	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.50	40.00
1934	36.00	36.00	36.00	37.20	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
1933	36.20	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	36.00
1932	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
1931	35.00	35.00	36.00	36.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1930	40.00	40.00	38.00	38.00	36.40	36.00	36.00	36.00	36.00	36.00	36.00	35.50
1929	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	40.00	40.00
1928	41.50	43.50	44.00	44.00	44.00	44.00	42.00	42.00	42.00	42.00	42.00	42.00
1927	45.00	43.50	43.00	42.50	42.00	42.00	43.00	43.00	43.00	42.50	41.00	40.00

By-Product Foundry Coke

Per Net Ton

Birmingham, ovens

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$6.50	$6.50	$6.50	$6.50	$6.50	$6.50	$6.50	$6.50	$6.50	$6.50	$6.50	$6.50
1935	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1934	5.00	5.00	5.00	5.40	5.50	5.70	6.00	6.00	6.00	6.00	6.00	6.00
1933	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.40	4.50	4.75	4.85	4.85
1932	4.50	4.50	4.50	4.50	4.50	4.50	4.25	4.50	4.50	4.50	4.15	4.00
1931	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.75
1930	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1929	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1928	5.00	5.00	5.00	3.95	4.80	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1927	5.15	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.25	5.00

Chicago, ovens

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$9.75	$9.75	$9.75	$9.75	$9.75	$9.75	$9.75	$9.75	$9.75	$9.75	$9.75	$9.75
1935	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	9.00	9.00	9.00
1934	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50
1933	7.00	7.00	7.00	7.00	7.00	7.15	7.50	7.50	8.00	8.00	8.00	8.00
1932	7.50	7.50	7.50	7.50	7.30	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1931	8.00	8.00	8.00	8.00	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
1930	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1929	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1928	9.00	9.00	9.00	9.00	9.00	8.50	8.00	8.00	8.00	8.00	8.00	8.00
1927	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.30	9.00

Newark, delivered

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$9.70	$9.70	$9.70	$9.70	$9.70	$9.70	$9.70	$9.70	$9.70	$10.20	$10.20	$10.20
1935	8.83	9.20	9.20	9.20	9.20	9.20	9.20	9.20	9.20	9.20	9.20	9.20
1934	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71	8.71
1933	8.21	8.21	8.21	8.21	8.21	8.21	8.21	8.21	8.51	8.71	8.71	8.71
1932	8.76	8.76	8.76	8.76	8.23	8.21	8.21	8.21	8.21	8.21	8.21	8.21
1931	9.00	9.00	9.00	9.00	9.00	8.70	8.70	8.70	8.70	8.70	8.70	8.70
1930	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1929	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1928	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1927	9.84	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59

St. Louis, delivered

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00
1935	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.80	10.00	10.00
1934	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25
1933	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	8.15	8.50	8.75	9.00
1932	8.50	8.50	8.50	8.50	8.50	7.95	7.75	7.75	7.75	7.75	7.75	7.75
1931	9.00	9.00	9.00	9.00	9.00	8.60	8.50	8.50	8.50	8.50	8.50	8.50
1930	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1929	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1928	9.75	9.75	9.75	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1927	10.50	10.50	10.50	*9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75

New England, delivered

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$11.50	$11.50	$11.50	$11.50	$11.50	$11.50	$11.50	$11.50	$11.50	$11.75	$11.75	$12.00
1935	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.40	11.50	11.50
1934	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.87	11.00
1933	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.30	10.50	10.50	10.50
1932	10.50	10.50	10.50	10.50	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
1931	11.00	11.00	11.00	11.00	11.00	10.50	10.50	10.50	10.50	10.50	10.50	10.50
1930	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1929	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1928	11.50	11.50	11.50	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1927	13.50	12.65	12.50	12.50	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00

Beehive Coke

Per Net Ton

Foundry, Spot, Connellsville

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$4.00	$4.20	$4.10	$4.25	$4.25	$4.25	$4.25	$4.25	$4.25	$4.25	$4.25	$4.25
1935	4.60	4.60	4.60	4.60	4.60	4.60	4.25	4.00	4.00	4.35	4.35	4.25
1934	4.25	4.25	4.25	4.55	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
1933	2.50	2.50	2.25	2.25	2.25	2.40	2.80	3.10	3.15	3.85	4.25	4.25
1932	3.25	3.25	3.25	3.25	3.15	3.00	3.00	2.90	2.75	2.75	2.65	2.50
1931	3.30	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1930	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1929	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.55	3.50
1928	3.75	3.75	3.75	3.65	3.55	3.50	3.50	3.75	3.75	3.75	3.75	3.75
1927	4.25	3.85	4.15	4.05	3.80	3.90	4.00	4.00	4.00	3.75	3.75	3.65

Furnace, Spot, Connellsville

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$3.50	$3.50	$3.50	$3.50	$3.50	$3.50	$3.45	$3.45	$3.90	$4.00	$4.00	$4.00
1935	3.60	3.60	3.60	3.60	3.60	3.50	3.30	3.25	3.25	3.55	3.55	3.65
1934	3.60	3.50	3.35	3.30	3.45	3.60	3.60	3.60	3.60	3.60	3.60	3.60
1933	1.75	1.75	1.75	1.75	1.75	1.80	2.40	2.75	2.50	3.25	3.75	3.75
1932	2.25	2.25	2.25	2.25	2.15	2.00	2.00	2.00	2.00	2.00	1.80	1.80
1931	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.40	2.40	2.40	2.35	2.30
1930	3.55	2.60	2.60	2.60	2.55	2.50	2.50	2.50	2.60	2.60	2.55	2.50
1929	2.75	2.90	2.95	2.75	2.75	2.75	2.75	2.75	2.65	2.65	2.65	2.65
1928	2.70	2.65	2.60	2.60	2.55	2.60	2.60	2.75	2.75	2.80	2.75	2.75
1927	3.35	3.35	3.30	3.20	2.80	2.85	2.90	3.00	2.85	2.85	2.80	2.65

Iron and Steel Scrap

Per Gross Ton Delivered

Heavy Melting Steel, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$14.50	$14.80	$15.75	$15.75	$14.75	$13.80	$14.15	$16.00	$17.75	$18.15	$17.25	$18.50
1935	13.50	13.25	12.40	11.70	12.00	12.25	12.30	13.25	13.45	13.65	13.65	14.05
1934	13.05	13.90	14.35	14.15	12.80	11.90	12.00	11.45	10.75	10.50	11.15	12.95
1933	8.35	8.25	8.75	9.90	11.65	11.65	12.70	13.75	13.00	12.45	11.65	11.50
1932	10.25	10.25	10.25	10.20	9.75	9.00	8.35	8.55	9.50	9.50	9.15	8.75
1931	13.00	12.75	12.90	12.50	11.25	10.30	10.50	10.70	10.80	10.45	10.25	10.25
1930	16.55	16.90	16.60	16.05	15.40	15.10	14.90	15.20	15.70	14.80	12.85	12.75
1929	19.00	18.60	18.50	18.60	17.85	18.30	18.45	18.90	18.45	17.30	16.30	15.10
1928	15.35	15.05	14.75	14.85	15.00	14.70	14.10	15.00	16.55	17.35	17.35	17.50
1927	17.00	16.10	16.40	16.50	15.50	15.10	14.95	15.00	15.00	14.50	14.50	14.60

Heavy Melting Steel, Detroit (dealers)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$10.00	$11.30	$12.10	$11.45	$10.45	$10.00	$10.90	$12.50	$14.00	$14.75	$13.65	$13.75
1935	9.50	9.75	7.90	7.50	7.60	8.40	8.40	9.30	9.50	9.50	9.50	9.75
1934	8.75	9.50	10.15	9.70	8.90	8.00	8.00	7.80	7.75	7.50	8.00	8.80
1933	4.50	4.50	4.50	5.40	7.75	7.80	8.95	9.50	8.55	7.35	7.00	7.25
1932	5.55	5.75	5.75	5.70	5.10	4.75	3.90	4.25	5.55	5.75	5.30	4.60
1931	9.50	9.50	9.15	8.65	8.15	7.40	7.55	7.30	6.80	6.15	6.00	5.80
1930	12.25	12.00	11.85	11.70	11.30	11.00	10.85	10.95	11.15	10.95	9.95	9.55
1929	14.20	14.35	14.05	14.25	13.90	13.50	13.75	14.35	14.20	13.40	12.40	12.50
1928	11.44	11.25	11.05	10.75	11.00	10.88	10.38	10.50	11.69	12.50	13.30	13.50
1927	12.50	12.50	12.70	12.88	11.88	11.50	11.56	11.75	11.70	11.50	11.38	11.25

Heavy Melting Steel, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$13.40	$14.30	$14.75	$14.35	$13.05	$12.75	$13.25	$15.45	$16.15	$16.25	$16.50	$16.50
1935	12.15	11.65	10.45	10.05	10.20	10.25	10.40	12.35	12.55	12.50	13.20	13.75
1934	10.44	10.87	12.00	11.75	11.13	9.75	9.55	9.25	8.65	8.75	9.00	10.15
1933	5.25	5.25	5.25	6.55	8.70	8.80	10.45	10.40	9.95	9.35	8.35	8.75
1932	7.25	6.80	6.75	6.55	6.20	5.60	4.50	5.40	5.75	6.00	5.75	5.50
1931	10.00	9.85	9.75	9.60	8.65	8.50	8.50	8.25	7.95	7.75	7.65	7.50
1930	12.65	13.25	13.20	13.00	12.55	12.05	12.00	12.00	12.25	11.55	10.20	10.00
1929	16.50	16.00	15.55	15.95	15.45	14.95	14.75	15.05	15.05	14.45	13.05	12.50
1928	12.25	12.55	12.75	12.75	12.95	12.60	12.30	12.65	12.90	13.75	14.50	14.50
1927	13.20	13.10	13.05	13.10	12.35	12.00	12.10	12.35	12.20	11.75	11.50	11.95

Heavy Melting Steel, Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$12.37	$13.15	$13.46	$13.75	$12.65	$11.70	$12.25	$13.85	$15.37	$15.65	$14.80	$15.25
1935	11.40	11.25	10.60	10.15	10.45	10.45	10.30	11.40	12.20	12.00	12.05	12.25
1934	11.63	11.73	11.70	11.50	11.00	10.40	10.25	9.85	9.60	9.50	9.95	10.85
1933	6.50	6.50	6.50	6.90	9.00	9.50	10.55	12.00	10.70	10.20	9.55	10.50
1932	7.50	7.35	7.35	7.20	6.50	6.25	6.25	6.40	7.25	7.25	7.25	6.50
1931	10.50	10.50	10.50	10.00	9.50	8.75	8.25	8.55	8.75	8.20	7.95	7.50
1930	14.50	14.50	14.95	13.95	13.40	13.25	12.50	12.65	13.00	12.00	11.50	11.00
1929	16.50	16.30	16.25	17.00	16.25	16.25	16.50	16.75	16.37	15.80	15.15	14.50
1928	14.00	14.00	13.75	13.75	13.75	13.15	12.75	12.75	14.65	16.00	15.90	15.50
1927	15.60	15.00	14.75	14.75	14.45	14.25	13.75	13.75	14.00	14.00	14.00	14.00

Compressed Sheets, Detroit (dealers)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$10.45	$11.55	$12.50	$12.10	$10.85	$10.50	$11.05	$12.75	$14.25	$14.40	$13.60	$13.95
1935	10.00	9.60	7.95	7.75	7.95	8.50	8.75	9.80	10.05	10.05	9.75	9.90
1934	8.50	9.40	10.30	9.70	8.90	7.90	8.00	7.80	7.75	7.50	7.75	9.00
1933	4.00	4.00	4.06	5.15	7.50	7.80	8.85	9.50	8.55	7.35	7.00	7.45
1932	5.55	5.75	5.75	5.70	5.10	4.75	3.75	3.80	5.00	5.50	5.05	4.06
1931	8.92	9.45	9.00	9.00	7.75	6.95	6.95	6.80	6.50	6.15	6.00	6.00
1930	12.00	11.75	11.40	11.25	10.85	10.50	10.50	10.85	11.15	10.90	9.65	8.81
1929	14.65	14.45	14.00	14.00	14.00	13.65	14.00	14.00	14.00	13.40	12.15	11.50
1928	10.38	10.25	10.10	10.63	10.60	10.25	9.88	10.19	11.69	12.50	13.15	13.44
1927	11.38	11.50	11.50	11.69	10.56	10.35	10.81	11.25	11.10	10.38	10.00	10.00

No. 1 Railroad Wrought, Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$12.50	$13.20	$14.00	$14.25	$13.45	$13.25	$13.75	$14.65	$15.31	$16.00	$15.50	$16.00
1935	11.75	11.60	11.05	10.35	10.35	10.75	10.75	11.55	12.25	12.25	12.25	12.25
1934	12.75	12.75	12.75	12.25	11.55	10.00	10.20	9.80	9.50	10.25	10.70	11.65
1933	6.50	6.50	6.75	7.35	10.25	10.25	11.60	13.00	11.60	10.75	10.15	11.00
1932	9.35	9.00	9.00	7.95	7.75	6.70	6.25	6.25	7.75	7.25	7.25	6.50
1931	13.25	12.50	11.00	11.00	11.00	10.50	10.00	9.75	9.75	9.50	9.50	9.50
1930	15.25	15.25	15.25	15.75	15.40	15.25	14.25	14.25	14.25	14.25	13.50	13.50
1929	15.50	16.25	16.25	16.25	16.25	16.25	16.25	16.25	16.13	16.00	16.25	15.25
1928	15.25	15.25	15.25	15.25	15.25	15.25	15.25	14.80	15.10	15.50	15.50	15.50
1927	17.00	17.00	17.65	16.75	16.75	16.75	16.25	15.95	15.75	15.75	15.75	15.75

No. 1 Cast, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$13.75	$13.55	$14.60	$14.90	$14.65	$15.00	$15.15	$16.00	$16.75	$17.00	$17.00	$17.50
1935	13.50	13.25	12.40	11.65	12.50	12.70	13.50	13.75	14.00	13.95	13.75	13.75
1934	12.50	12.65	13.10	12.85	12.40	13.00	13.00	12.40	12.00	12.00	12.20	13.50
1933	8.55	9.00	9.00	9.00	10.10	10.40	10.65	10.60	10.60	11.20	11.00	11.00
1932	10.00	9.80	9.50	9.50	9.20	9.00	8.60	8.50	9.50	9.50	9.25	9.00
1931	12.50	12.50	12.50	12.20	11.50	10.85	10.00	10.00	10.00	10.00	10.00	10.00
1930	14.75	14.50	14.50	15.00	14.50	14.00	14.00	14.00	14.00	13.40	12.40	12.50
1929	15.30	14.50	15.20	15.45	15.00	15.00	15.00	15.00	15.00	15.00	14.90	14.50
1928	14.50	14.50	14.50	14.75	14.60	14.00	14.00	14.05	14.25	14.55	15.10	14.70
1927	16.00	15.60	15.60	16.00	15.75	15.10	15.00	15.00	15.00	14.70	14.50	14.50

No. 1 Cast, Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$12.75	$13.45	$17.00	$14.88	$14.15	$13.75	$14.31	$15.55	$16.62	$16.65	$16.00	$17.25
1935	11.60	11.95	11.75	11.55	11.50	11.50	11.50	11.60	12.25	12.25	12.75	12.75
1934	11.50	11.65	12.30	12.50	12.15	12.00	11.25	11.00	11.00	11.00	11.00	12.25
1933	9.00	9.00	9.00	9.10	10.25	10.35	11.20	11.75	12.40	12.00	11.95	12.00
1932	11.20	10.00	10.00	9.50	9.25	9.00	9.00	9.25	9.25	9.00	9.00	9.00
1931	12.80	13.00	13.00	13.00	12.75	12.50	12.50	12.50	12.50	12.50	11.70	11.50
1930	16.00	15.75	15.75	15.50	15.00	14.75	13.50	13.50	13.50	13.50	13.50	12.50
1929	16.75	16.75	16.50	16.50	16.50	16.50	16.50	16.50	16.25	16.25	16.00	16.00
1928	16.75	16.75	16.75	16.25	16.25	16.00	16.00	15.75	16.20	17.00	16.50	16.50
1927	17.75	17.50	17.50	17.25	17.25	16.75	16.35	16.25	16.25	16.25	16.75	16.75

No. 1 Cast, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$12.25	$12.75	$13.75	$13.75	$12.30	$12.25	$12.25	$13.65	$13.75	$14.15	$14.25	$14.25
1935	11.55	10.90	9.40	9.25	9.40	9.55	9.55	10.95	11.55	11.75	12.00	12.25
1934	8.90	9.00	9.05	9.05	9.00	8.50	8.50	8.50	8.15	8.40	8.75	9.55
1933	5.95	6.00	6.20	7.15	8.75	8.75	9.90	10.50	9.85	9.25	8.00	8.25
1932	8.90	8.90	8.40	7.85	7.00	6.40	6.15	6.45	7.30	7.30	6.85	6.70
1931	10.65	10.65	10.65	10.25	9.80	9.80	9.80	9.80	9.80	9.80	9.00	8.95
1930	15.10	15.25	15.70	15.60	14.80	14.25	13.45	13.45	13.45	12.90	10.95	10.65
1929	17.70	17.90	17.90	17.90	17.25	16.25	16.25	16.25	16.80	15.65	15.35	15.10
1928	15.75	15.75	15.65	15.65	15.90	15.95	15.95	15.95	16.30	16.55	16.90	17.35
1927	18.90	18.90	18.50	18.10	17.35	16.65	16.55	16.80	16.80	16.25	15.85	15.70

Cast Borings, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$8.30	$8.75	$8.70	$8.75	$8.75	$8.05	$7.90	$10.90	$11.95	$11.65	$11.50	$12.25
1935	6.50	6.90	7.00	6.10	6.00	6.65	6.50	7.00	7.30	8.15	8.15	8.00
1934	7.30	8.15	8.70	8.50	8.25	7.75	7.25	7.05	6.25	5.50	5.90	6.00
1933	5.70	5.70	5.55	5.70	6.90	7.65	9.05	9.80	9.05	8.30	7.60	7.50
1932	6.75	6.50	6.75	6.65	6.40	5.50	4.75	5.15	5.95	6.25	6.50	5.90
1931	7.70	7.70	7.65	7.60	7.50	7.75	7.05	7.50	7.45	7.50	7.10	6.80
1930	11.10	12.00	11.15	10.75	10.50	9.88	8.50	8.50	8.90	8.40	7.75	7.15
1929	12.55	12.25	11.50	12.15	11.55	11.85	12.10	12.50	12.40	11.80	11.15	10.75
1928	11.50	11.00	10.70	10.60	10.70	10.40	9.80	10.50	12.00	12.40	12.00	12.50
1927	12.50	12.00	12.10	12.38	11.13	10.50	10.50	11.50	11.30	11.00	11.00	11.60

Low Phosphorus Scrap, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$17.00	$17.25	$17.95	$17.90	$17.20	$15.90	$17.40	$18.75	$20.25	$20.25	$21.00	$22.00
1935	15.15	15.00	14.30	15.00	15.40	15.25	15.10	15.50	16.15	16.50	16.00	16.70
1934	16.00	16.25	16.90	16.90	15.55	14.45	14.50	14.00	13.50	13.40	13.75	15.00
1933	10.00	10.25	10.70	11.10	13.55	13.70	14.55	16.00	15.10	14.30	13.50	13.50
1932	13.90	13.00	13.15	13.85	13.00	12.00	10.60	10.50	10.50	10.60	10.75	10.50
1931	17.20	17.50	17.50	17.20	16.25	14.75	13.50	14.00	14.00	14.00	14.00	14.00
1930	21.50	21.75	21.85	21.60	20.50	19.50	19.00	19.35	20.00	19.30	17.60	17.50
1929	22.00	22.50	22.35	23.25	22.40	22.25	22.50	22.80	23.00	22.20	21.75	20.50
1928	18.85	18.50	18.20	18.35	18.50	18.50	18.50	19.00	20.00	20.75	21.00	21.00
1927	20.25	19.50	20.00	20.50	19.10	19.10	19.00	19.00	20.00	19.50	18.60	18.50

Machine Shop Turnings, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$9.75	$10.20	$10.50	$10.50	$9.75	$9.40	$9.50	$10.70	$12.40	$12.45	$11.75	$12.50
1935	8.95	8.80	7.40	7.40	8.15	8.25	8.15	8.80	9.55	9.70	9.45	9.65
1934	9.05	10.00	10.75	10.15	8.20	7.45	7.50	8.00	7.30	7.00	7.20	8.50
1933	6.25	6.25	6.30	6.75	8.00	8.40	9.35	10.45	9.75	9.30	8.00	8.00
1932	6.95	7.10	7.25	6.75	6.30	5.25	5.00	5.25	5.95	6.00	6.25	6.00
1931	6.00	6.80	7.80	7.30	6.75	6.50	6.70	7.30	7.50	7.20	7.00	7.00
1930	11.50	11.75	11.00	11.00	10.20	9.50	8.70	8.00	8.00	7.20	6.15	6.00
1929	12.50	11.25	10.65	11.05	11.00	11.35	11.85	12.40	12.00	11.40	10.75	10.25
1928	10.60	10.15	10.15	10.25	9.90	9.20	8.80	9.65	11.00	11.25	10.85	12.00
1927	12.00	11.00	11.60	12.40	11.15	10.50	10.85	12.50	11.75	11.50	11.15	11.45

Iron Car Wheels, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$13.45	$14.25	$14.75	$14.35	$13.50	$13.50	$13.50	$15.65	$16.25	$16.65	$16.75	$17.25
1935	12.25	12.15	11.15	10.75	10.75	10.75	10.75	12.45	12.75	12.75	13.05	13.25
1934	10.75	11.50	12.50	12.25	12.00	10.40	10.25	10.00	9.75	9.75	9.75	10.60
1933	7.65	8.15	8.35	8.75	9.75	9.75	9.75	9.75	9.75	9.50	9.25	9.75
1932	7.75	7.00	7.00	6.75	6.35	6.00	5.50	6.15	7.00	7.00	7.10	7.00
1931	11.25	10.75	10.60	9.50	9.25	10.20	10.00	9.90	9.50	9.50	9.00	8.75
1930	14.05	14.20	14.50	14.45	13.80	13.50	13.50	13.50	13.50	13.10	12.00	11.50
1929	14.10	14.50	14.50	14.75	14.50	14.20	13.60	14.00	14.00	14.00	13.60	13.65
1928	13.70	14.25	13.95	13.50	13.45	13.10	13.00	13.00	13.00	13.10	14.05	14.05
1927	14.95	15.10	15.00	14.85	14.00	13.50	13.80	14.75	14.25	13.50	13.15	13.40

Rails for Rolling, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$14.25	$15.50	$15.75	$15.75	$14.65	$14.00	$14.00	$16.40	16.75	$16.95	$17.25	$17.25
1935	12.90	12.55	11.55	11.05	11.05	11.25	11.25	13.65	13.90	14.00	14.30	14.75
1934	11.25	12.00	12.75	12.75	12.37	11.25	10.95	10.50	10.10	9.85	10.25	11.40
1933	8.00	7.75	7.95	8.50	10.25	10.25	11.15	11.25	11.25	11.10	10.25	10.25
1932	10.30	9.85	9.50	8.90	8.25	7.75	6.60	6.50	7.00	8.00	8.25	8.00
1931	13.00	12.10	12.00	11.85	11.15	10.90	10.50	10.50	10.50	10.50	10.00	10.00
1930	14.65	14.80	15.00	15.00	14.85	14.55	14.50	14.50	14.50	14.10	13.10	13.00
1929	17.10	17.50	17.50	17.50	17.50	17.50	17.50	17.75	17.60	17.05	15.30	14.60
1928	15.00	15.00	14.45	14.00	14.35	14.85	14.50	15.00	15.80	16.40	16.50	16.50
1927	16.00	16.00	15.50	15.85	15.10	14.60	14.60	15.00	15.20	14.70	13.95	14.00

Finished Material

Per pound f.o.b.

Steel Bars, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c	1.95c	1.95c	1.95c	2.05c	2.05c	2.05c
1935	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.85	1.85	1.85	1.85
1934	1.75	1.75	1.75	1.85	1.90	1.90	1.80	1.80	1.80	1.80	1.80	1.80
1933	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.75	1.75	1.75
1932	1.55	1.50	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1931	1.65	1.65	1.65	1.65	1.65	1.65	1.60	1.60	1.60	1.60	1.60	1.60
1930	1.90	1.85	1.85	1.80	1.75	1.75	1.70	1.65	1.60	1.60	1.60	1.60
1929	1.90	1.90	1.90	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.90
1928	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
1927	1.95	1.90	1.90	1.90	1.85	1.85	1.80	1.80	1.80	1.75	1.75	1.80

Tank Plates, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	1.80c	1.80c	1.80c	1.80c	1.80c	1.80c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c
1935	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
1934	1.70	1.70	1.70	1.80	1.85	1.85	1.80	1.80	1.80	1.80	1.80	1.80
1933	1.60	1.60	1.60	1.55	1.50	1.55	1.60	1.60	1.60	1.70	1.70	1.70
1932	1.55	1.50	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1931	1.65	1.65	1.65	1.65	1.65	1.65	1.60	1.60	1.60	1.60	1.60	1.50
1930	1.90	1.85	1.80	1.80	1.75	1.70	1.65	1.65	1.60	1.60	1.60	1.60
1929	1.90	1.90	1.90	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90
1928	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
1927	1.90	1.85	1.90	1.85	1.85	1.80	1.80	1.80	1.80	1.75	1.75	1.80

Structural Shapes, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	1.80c	1.80c	1.80c	1.80c	1.80c	1.80c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c
1935	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
1934	1.70	1.70	1.70	1.80	1.85	1.85	1.80	1.80	1.80	1.80	1.80	1.80
1933	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.70
1932	1.55	1.50	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1931	1.60	1.60	1.60	1.65	1.65	1.65	1.60	1.60	1.60	1.60	1.60	1.50
1930	1.90	1.85	1.80	1.80	1.75	1.70	1.65	1.65	1.60	1.60	1.60	1.60
1929	1.90	1.90	1.90	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90
1928	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
1927	1.95	1.90	1.90	1.90	1.85	1.80	1.80	1.80	1.80	1.75	1.75	1.80

No. 10 Blue Annealed Sheets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c	1.95c	1.95c	1.95c	1.95c	1.95c	1.95c
1935	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85
1934	1.75	1.75	1.75	1.90	2.00	2.00	1.85	1.85	1.85	1.85	1.85	1.85
1933	1.65	1.60	1.55	1.55	1.55	1.65	1.75	1.65	1.70	1.75	1.75	1.75
1932	1.75	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1931	1.90	1.90	1.90	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85
1930	2.15	2.10	2.10	2.10	2.00	2.00	2.00	1.95	1.95	1.95	1.90	1.90
1929	2.10	2.10	2.10	2.15	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.15
1928	2.10	2.10	2.10	2.05	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.10
1927	2.25	2.20	2.20	2.20	2.25	2.25	2.25	2.25	2.25	2.15	2.10	2.10

Automobile Sheets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	2.95c	2.95c	2.95c	2.95c	2.95c	2.95c	3.05c	3.05c	3.05c	3.05c	3.05c	3.05c
1935	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.95
1934	2.75	2.75	2.75	3.05	3.15	3.10	2.95	2.95	2.95	2.95	2.95	2.95
1933	2.40	2.45	2.45	2.55	2.55	2.55	2.55	2.60	2.75	2.75	2.75	2.75
1932	2.90	2.85	2.85	2.80	2.80	2.80	2.80	2.70	2.75	2.65	2.60	2.60
1931	3.30	3.30	3.30	3.15	3.05	3.10	3.10	3.10	3.10	3.10	3.10	3.00
1930	3.90	3.90	3.90	3.80	3.80	3.60	3.60	3.60	3.60	3.45	3.35	3.30
1929	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.05	4.00	4.00
1928	4.00	4.10	4.15	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.05	4.10
1927	4.20	4.15	4.15	4.15	4.25	4.25	4.25	4.25	4.25	4.15	4.15	4.10

No. 24 Black Sheets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c	2.50c	2.50c	2.50c	2.60c	2.60c	2.60c
1935	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
1934	2.25	2.25	2.25	2.50	2.65	2.65	2.45	2.40	2.40	2.40	2.40	2.40
1933	2.05	2.00	2.00	2.00	2.00	2.10	2.25	2.25	2.25	2.25	2.25	2.25
1932	2.20	2.15	2.20	2.20	2.20	2.20	2.20	2.15	2.10	2.10	2.10	2.20
1931	2.35	2.35	2.35	2.25	2.25	2.15	2.40	2.40	2.40	2.40	2.40	2.40
1930	2.70	2.65	2.65	2.65	2.55	2.55	2.55	2.50	2.40	2.40	2.35	2.35
1929	2.85	2.85	2.85	2.90	2.95	2.95	2.85	2.85	2.85	2.80	2.75	2.75
1928	2.80	2.85	2.85	2.75	2.75	2.70	2.65	2.65	2.70	2.70	2.80	2.85
1927	2.95	2.90	2.90	2.80	2.90	3.00	3.00	3.00	3.00	2.95	2.80	2.75

No. 24 Galvanized Sheets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	3.10c	3.10c	3.10c	3.10c	3.10c	3.10c	3.20c	3.20c	3.20c	3.20c	3.20c	3.20c
1935	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
1934	2.85	2.85	2.85	3.10	3.25	3.25	3.10	3.10	3.10	3.10	3.10	3.10
1933	2.70	2.50	2.60	2.65	2.70	2.70	2.85	2.85	2.85	2.85	2.85	2.85
1932	2.80	2.75	2.80	2.85	2.85	2.85	2.85	2.80	2.75	2.80	2.85	2.85
1931	2.90	2.90	2.90	2.85	2.80	2.80	2.90	2.90	2.90	2.90	2.90	2.90
1930	3.35	3.30	3.30	3.30	3.25	3.20	3.15	3.10	3.00	3.00	2.95	2.90
1929	3.60	3.60	3.60	3.65	3.70	3.65	3.60	3.55	3.50	3.50	3.45	3.40
1928	3.65	3.65	3.75	3.65	3.65	3.55	3.50	3.50	3.50	3.50	3.55	3.60
1927	3.80	3.70	3.70	3.65	3.80	3.80	3.85	3.85	3.85	3.80	3.70	3.60

Cold-Finished Steel Bars, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	2.10c	2.10c	2.10c	2.10c	2.10c	2.15c	2.25c	2.25c	2.25c	2.35c	2.35c	2.55c
1935	2.10	2.10	2.10	2.00	1.95	1.95	1.95	1.95	1.95	1.95	1.95	2.05
1934	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
1933	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.95	1.95	1.95	1.95	1.95
1932	2.00	2.00	1.90	1.90	1.75	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1931	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.00
1930	2.15	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.05	2.00
1929	2.20	2.20	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.20	2.20
1928	2.30	2.25	2.25	2.20	2.20	2.15	2.10	2.15	2.20	2.20	2.20	2.20
1927	2.35	2.35	2.40	2.40	2.40	2.35	2.30	2.30	2.20	2.15	2.10	2.10

Tin Plate, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25
1935	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
1934	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
1933	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.65	4.65	4.65	5.25
1932	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.50	4.25
1931	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.75	4.75	4.75
1930	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.00	5.00	5.00
1929	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35
1928	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.30	5.35
1927	5.50	5.50	5.50	5.50	5.50	5.45	5.50	5.50	5.50	5.30	5.30	5.25

Cold-Rolled Strip, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c
1935	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
1934	2.40	2.40	2.40	2.65	2.80	2.80	2.60	2.60	2.60	2.60	2.60	2.60
1933	1.95	1.80	1.85	1.80	1.90	2.00	2.25	2.25	2.30	2.40	2.40	2.40
1932	2.00	1.90	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.95	2.00	2.00
1931	2.25	2.25	2.25	2.20	2.15	2.15	2.15	2.15	2.15	2.15	2.10	2.05
1930	2.70	2.65	2.60	2.55	2.50	2.45	2.45	2.40	2.35	2.35	2.35	2.25
1929	2.85	2.85	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1928	3.00	3.10	3.15	*2.75	2.75	2.75	2.75	2.70	2.75	2.75	2.80	2.85
1927	3.10	2.90	2.95	3.00	3.00	3.25	3.25	3.25	3.15	2.95	2.95	3.00

*April, 1928, and subsequently, prices are for 3 tons or over instead of less than 3 tons.

Hot-Rolled Strip, Wide, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c	1.95c	1.95c	1.95c	1.95c	1.95c	1.95c
1935	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85
1934	1.75	1.75	1.75	1.95	2.00	2.00	1.85	1.85	1.85	1.85	1.85	1.85
1933	1.45	1.45	1.45	1.45	1.55	1.55	1.60	1.65	1.70	1.75	1.75	1.75
1932	1.40	1.40	1.40	1.45	1.50	1.50	1.45	1.45	1.45	1.45	1.45	1.45
1931	1.55	1.55	1.55	1.55	1.50	1.50	1.55	1.55	1.55	1.55	1.50	1.45
1930	1.85	1.80	1.80	1.70	1.70	1.70	1.65	1.65	1.65	1.60	1.55	1.55
1929	1.80	1.85	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
1928	1.85	1.85	1.90	1.90	1.85	1.85	1.90	1.85	1.80	1.80	1.80	1.80
1927	2.20	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.00	1.90

Plain Wire, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	2.30c	2.30c	2.30c	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c	2.50c	2.50c	2.60c
1935	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
1934	2.20	2.20	2.20	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
1933	2.15	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.20
1932	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
1931	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
1930	2.40	2.40	2.40	2.40	2.35	2.30	2.30	2.30	2.30	2.30	2.30	2.25
1929	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.40
1928	2.40	2.45	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.40	2.40	2.50
1927	2.50	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40

Wire Nails, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	2.40c	2.40c	2.15c	2.10c	2.10c	2.10c	2.10c	2.10c	1.95c	2.05c	2.05c	2.20c
1935	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.55	2.40	2.40	2.40	2.40
1934	2.35	2.35	2.35	2.50	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
1933	1.90	1.85	1.85	1.85	1.85	1.85	2.05	2.10	2.10	2.10	2.10	2.35
1932	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1931	1.90	1.90	1.90	1.90	1.90	1.80	1.85	1.90	1.90	1.90	1.90	1.90
1930	2.35	2.30	2.30	2.25	2.15	2.15	2.10	2.05	2.00	2.00	1.95	1.90
1929	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.50	2.45	2.40	2.40
1928	2.50	2.60	2.65	2.60	2.60	2.60	2.55	2.55	2.55	2.55	2.55	2.65
1927	2.65	2.60	2.55	2.55	2.50	2.55	2.55	2.55	2.55	2.55	2.50	2.50

Bar Iron, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	1.75c	1.75c	1.75c	1.75c	1.75c	1.75c	1.85c	1.85c	1.85c	1.95c	1.95c	1.95c
1935	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
1934	1.60	1.60	1.60	1.60	1.75	1.80	1.77	1.75	1.75	1.75	1.75	1.75
1933	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	*1.60	1.60	1.60	1.60
1932	1.60	1.70	1.70	1.70	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
1931	1.70	1.75	1.70	1.80	1.80	1.70	1.70	1.70	1.70	1.70	1.65	1.60
1930	2.00	1.95	1.95	1.95	1.90	1.90	1.90	1.80	1.75	1.75	1.70	1.70
1929	2.00	2.05	2.00	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.00	2.00
1928	1.90	1.95	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1927	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.90	1.85	1.90

*Beginning September, Terre Haute, Ind., base quoted freight to Chicago, 18 cents.

Rail Steel Bars, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	1.75c	1.75c	1.75c	1.75c	1.75c	1.75c	1.85c	1.85c	1.85c	1.95c	1.95c	1.95c
1935	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
1934	1.70	1.70	1.70	1.79	1.85	1.85	1.77	1.75	1.75	1.75	1.75	1.75
1933	1.50	1.45	1.45	1.45	1.50	1.50	1.50	1.50	1.60	1.70	1.70	1.70
1932	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
1931	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.50	1.50	1.50
1930	1.85	1.85	1.85	1.85	1.80	1.75	1.75	1.65	1.65	1.65	1.65	1.65
1929	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.95	1.90
1928	1.80	1.80	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.90	1.95	2.00
1927	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.80	1.80	1.80

Tie Plates, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	2.00c	2.00c	2.00c	2.00c
1935	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
1934	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
1933	1.75	1.75	1.75	1.75	1.75	1.75	1.80	1.80	1.80	1.80	1.80	1.80
1932	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.75	1.75	1.75
1931	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90
1930	2.10	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.00	1.95
1929	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
1928	2.25	2.25	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
1927	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.25	2.25

Railroad Spikes, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.75c	2.75c	2.75c	2.85c
1935	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.60
1934	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
1933	2.40	2.40	2.25	2.25	2.15	2.15	2.40	2.40	2.40	2.40	2.40	2.40
1932	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.40	2.40	2.40
1931	2.80	2.80	2.80	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.65
1930	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1929	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1928	2.70	2.75	2.75	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1927	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80

Angle Bars, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c
1935	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
1934	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
1933	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
1932	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.65	2.65
1931	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1930	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1929	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1928	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1927	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75

Track Bolts, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	3.60c	3.60c	3.60c	3.60c	3.60c	3.60c	3.60c	3.60c	3.75c	3.75c	3.75c	3.75c
1935	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.60
1934	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
1933	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.40	3.40	3.40	3.45	3.45
1932	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1931	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.70
1930	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
1929	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
1928	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
1927	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.80	3.80	3.80

Structural Rivets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	2.90c	2.90c	2.90c	2.90c	2.90c	2.95c	3.05c	3.05c	3.05c	3.05c	3.05c	3.20c
1935	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
1934	2.75	2.75	2.75	2.90	3.00	3.00	2.95	2.90	2.90	2.90	2.90	2.90
1933	2.25	2.25	2.25	2.25	2.25	2.35	2.50	2.50	2.50	2.60	2.75	2.75
1932	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25
1931	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.55	2.30	2.25	2.25
1930	3.10	3.10	3.10	3.10	3.00	2.90	2.90	2.75	2.75	2.75	2.75	2.75
1929	2.85	2.90	2.95	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
1928	2.75	2.75	2.80	2.90	2.90	2.90	2.90	2.85	2.80	2.80	2.80	2.80
1927	2.35	2.30	2.30	2.75	2.75	2.75	2.75	2.85	2.85	2.75	2.75	2.75

Cast Iron Pipe, New York

6-Inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$44.50	$45.00
1935	42.00	42.00	42.00	42.25	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
1934	40.00	40.00	40.00	40.00	40.00	40.50	42.00	42.00	42.00	42.00	42.00	42.00
1933	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	34.00	34.50	38.60	40.00
1932	28.00	28.00	28.00	28.00	28.00	26.50	26.00	30.00	32.00	32.00	32.00	32.00
1931	38.10	37.50	37.50	37.50	37.75	34.50	33.70	32.00	28.50	29,10	29.00	28.00
1930	36.90	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50
1929	38.85	39.80	39.80	39.05	38.20	38.00	37.90	37.50	37.50	37.50	36.75	36.50
1928	37.15	36.75	36.75	37.25	37.65	38.25	28.08	37.60	37.60	37.10	37.20	38.60
1927	49.50	49.50	49.50	49.50	48.60	47.95	46.00	44.00	38.25	36.90	37.25	37.25

Cast Iron Pipe, Birmingham

6-Inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$39.00	$39.00	$39.00	$39.00	$39.00	$39.00	$39.00	$39.00	$39.00	$39.00	$39.00	$41.00
1935	38.00	38.00	38.00	38.50	39.00	39.00	39.00	39.00	39.00	39.00	39.00	39.00
1934	36.00	36.00	36.00	36.00	36.00	36.40	38.00	38.00	38.00	38.00	38.00	38.00
1933	32.00	32.00	32.00	32.00	32.00	34.25	35.00	35.00	35.00	35.00	35.25	36.00
1932	33.00	32.20	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
1931	37.00	37.00	36.50	35.00	35.00	35.00	35.00	35.00	33.00	33.00	33.00	33.00
1930	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
1929	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
1928	29.00	29.00	28.50	30.00	33.50	31.00	32.50	34.00	34.00	35.00	36.40	37.00
1927	36.00	36.00	36.50	36.00	36.50	34.80	34.00	30.75	29.80	28.75	29.00	29.00

Cast Iron Pipe, Chicago

6-Inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1936	$47.40	$47.40	$47.40	$47.40	$47.40	$47.40	$47.40	$47.40	$47.40	$47.40	$47.40	$49.40
1935	46.00	46.00	46.00	46.70	47.70	47.40	47.40	47.40	47.40	47.40	47.40	47.40
1934	44.00	44.00	44.00	44.00	44.00	44.80	46.00	46.00	46.00	46.00	46.00	46.00
1933	40.40	40.40	40.40	40.40	40.40	42.65	43.40	43.40	43.40	43.00	43.25	44.00
1932	40.40	38.80	38.40	34.40	34.40	34.40	34.40	34.40	38.90	40.40	40.40	40.00
1931	45.20	45.20	43.70	42.10	42.20	42.00	42.00	39.00	40.00	40.00	40.00	40.00
1930	44.40	45.20	45.20	45.20	44.00	43.20	44.80	45.20	45.20	45.20	45.20	45.20
1929	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20
1928	36.20	36.20	36.70	38.20	39.00	39.00	41.45	42.00	42.20	42.70	45.00	45.20
1927	45.70	43.70	44.00	44.20	43.20	42.80	42.20	38.95	36.20	34.30	35.30	35.30

IRON AND STEEL PRICE COMPOSITE

An unweighted average of 25 per-ton quotations, including 5 pig iron, 3 semifinished steel and 12 finished steel products

1931

Monthly Averages

January	$31.69
February	31.64
March	31.65
April	31.47
May	31.07
June	30.82
July	30.78
August	30.73
September	30.61
October	30.30
November	30.16
December	29.90
Average for year	30.90

1932

Jan. 2	29.60
9	29.56
16	29.76
23	29.70
30	29.62
Average for January	29.65
Feb. 6	29.25
13	29.24
20	29.24
27	29.22
Average for February	29.24
Mar. 5	29.23
12	29.23
19	29.21
26	29.45
Average for March	29.28
April 2	29.47
9	29.41
16	29.40
23	29.46
30	29.45
Average for April	29.44
May 7	29.39
14	29.36
21	29.29
28	29.30
Average for May	29.34
June 4	29.20
11	29.12
18	29.08
25	28.97
Average for June	29.09
July 2	28.95
9	28.91
16	28.83
23	28.83
30	28.83
Average for July	28.87
Aug. 6	28.67
13	28.76
20	28.81
27	28.84
Average for August	28.77
Sept. 3	28.90
10	28.91
17	28.96
24	28.96
Average for September	28.93
Oct. 1	28.97
8	28.97
15	28.96
22	28.81
29	27.79
Average for October	28.90
Nov. 5	28.81
12	28.80
19	28.77
26	28.77
Average for November	28.79
Dec. 3	28.32
10	28.28
17	28.26
24	28.26
31	28.26
Average for December	28.28
Average for year	29.05

1933

Jan. 7	$28.26
14	28.27
21	28.08
28	28.08
Average for January	28.17
Feb. 4	27.99
11	27.92
18	27.92
25	27.91
Average for February	27.94
Mar. 4	27.90
11	27.91
18	27.91
25	27.95
Average for March	27.92
April 1	27.71
8	27.74
15	27.77
22	27.80
29	27.90
Average for April	27.78
May 6	28.19
13	28.28
20	28.42
27	28.43
Average for May	28.33
June 3	28.46
10	28.75
17	28.77
24	28.85
Average for June	28.71
July 1	29.23
8	29.61
15	29.82
22	29.80
29	29.88
Average for July	29.67
Aug. 5	29.93
12	29.91
19	29.91
26	29.94
Average for August	29.92
Sept. 2	30.27
9	30.29
16	30.26
23	30.31
30	30.65
Average for September	30.36
Oct. 7	30.59
14	30.52
21	30.58
28	30.42
Average for October	30.53
Nov. 4	30.27
11	30.28
18	30.21
25	30.24
Average for November	30.25
Dec. 2	30.92
9	30.96
16	31.01
23	31.07
30	31.07
Average for December	31.01
Average for year	29.25

1934

Jan. 6	$31.10
13	31.13
20	31.17
27	31.20
Average for January	31.15
Feb. 3	31.21
10	31.30
17	31.33
24	31.34
Average for February	31.30
Mar. 3	31.36
10	31.43
17	31.42
24	31.34
31	31.34
Average for March	31.38
April 7	31.33
14	33.15
21	33.12
28	33.09
Average for April	32.67
May 5	33.03
12	33.00
19	32.94
26	32.89
Average for May	32.97
June 2	32.81
9	32.83
16	32.84
23	33.16
30	33.15
Average for June	32.96
July 7	32.38
14	32.33
21	32.28
28	32.28
Average for July	32.32
Aug. 4	32.28
11	32.23
18	32.23
25	32.22
Average for August	32.24
Sept. 1	32.17
8	32.17
15	32.14
22	32.13
29	32.13
Average for September	32.15
Oct. 6	32.09
13	32.09
20	32.09
27	32.12
Average for October	32.10
Nov. 3	32.13
10	32.13
17	32.15
24	32.18
Average for November	32.15
Dec. 1	32.22
8	32.35
15	32.44
22	32.46
29	32.46
Average for December	32.39
Average for year	32.15

1935

Jan. 5	$32.51
12	32.57
19	32.62
26	32.60
Average for January	32.58
Feb. 2	32.56
9	32.56
16	32.54
23	32.50
Average for February	32.54
Mar. 2	32.42
9	32.39
16	32.38
23	32.33
30	32.30
Average for March	32.36
April 6	32.27
13	32.27
20	32.31
27	32.30
Average for April	32.29
May 4	32.30
11	32.34
18	32.34
25	32.41
Average for May	32.35
June 1	32.43
8	32.45
15	32.41
22	32.40
29	32.39
Average for June	32.42
July 6	32.39
13	32.40
20	32.42
27	32.55
Average for July	32.44
Aug. 3	32.59
10	32.64
17	32.68
24	32.72
31	32.78
Average for August	32.68
Sept. 7	32.79
14	32.81
21	32.83
28	32.83
Average for September	32.82
Oct. 5	32.82
12	32.86
19	32.83
26	32.85
Average for October	32.84
Nov. 2	32.98
9	33.16
16	33.16
23	33.17
30	33.28
Average for November	33.15
Dec. 7	33.30
14	33.32
21	33.31
28	33.31
Average for December	33.31
Average for year	32.65

1936

Jan. 4	$33.31
11	33.33
18	33.34
25	33.38
Average for January	33.34
Feb. 1	33.40
8	33.44
15	33.45
22	33.54
29	33.59
Average for February	33.48
Mar. 7	33.60
14	33.04
21	33.05
28	33.13
Average for March	33.20
April 4	33.13
11	33.11
18	33.09
25	33.08
Average for April	33.10
May 2	33.00
9	32.96
16	32.94
23	32.87
30	32.83
Average for May	32.92
June 6	32.81
13	32.77
20	32.77
27	32.79
Average for June	32.79
July 4	33.48
11	33.48
18	33.49
25	33.51
Average for July	33.49
Aug. 1	33.72
8	33.82
15	33.88
22	33.94
29	34.03
Average for August	33.88
Sept. 5	34.10
12	34.10
19	34.22
26	34.19
Average for September	34.15
Oct. 3	34.62
10	34.60
17	34.68
24	34.66
31	34.62
Average for October	34.65
Nov. 7	34.60
14	34.60
21	34.59
28	34.79
Average for November	34.64
Dec. 5	34.99
12	35.08

STEEL INGOT PRODUCTION, 1917-1937

Compiled by American Iron and Steel Institute

	—1917—		—1918—		—1919—		—1920—	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January			2,641,196	97,822	3,650,845	135,216	3,524,026	130,519
February			2,724,962	113,540	3,177,311	132,388	3,401,760	141,740
March	18,552,562	142,712	3,727,632	143,370	3,127,481	120,288	3,916,960	145,073
April			3,791,184	145,815	2,631,087	101,196	3,132,458	120,479
May			3,939,580	145,910	2,266,109	83,930	3,423,178	131,661
June	3,617,322	139,128	3,695,352	147,814	2,607,015	104,281	3,538,971	136,114
July	3,447,461	137,898	3,731,532	143,520	2,946,465	113,326	3,327,785	127,992
August	3,663,405	135,682	3,695,632	136,875	3,225,942	124,075	3,562,411	137,016
September	3,486,337	139,453	3,832,228	153,289			3,561,365	136,976
October	3,931,681	145,618	4,017,435	148,794	10,062,540	96,755	3,580,873	137,726
November	3,713,889	142,842	3,668,164	141,083			3,132,891	120,496
December	3,206,543	128,262	3,586,125	143,445			2,778,714	106,874
Total	43,619,200	*140,255	43,051,022	*138,428	33,694,795	*108,343	40,881,392	*131,030

	—1921—		—1922—		—1923—		—1924—	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	2,517,042	96,809	1,891,857	72,764	3,841,095	142,263	3,649,913	135,182
February	1,998,705	83,279	2,071,772	86,324	3,471,843	114,660	3,826,246	153,050
March	1,794,777	66,473	2,814,667	104,247	4,066,680	150,618	4,206,699	161,796
April	1,386,897	53,342	2,902,240	116,090	3,963,736	158,549	3,348,466	128,787
May	1,446,181	55,622	3,218,794	119,215	4,216,355	156,161	2,640,034	97,779
June	1,146,350	44,090	3,127,775	120,299	3,767,256	144,894	2,065,676	82,627
July	917,824	36,713	2,952,806	118,112	3,531,458	141,258	1,877,789	72,223
August	1,300,199	48,156	2,629,256	97,380	3,695,788	136,881	2,552,891	98,188
September	1,342,092	51,619	2,818,261	108,395	3,356,776	134,271	2,827,625	108,755
October	1,847,139	71,044	3,410,265	131,164	3,577,091	132,485	3,125,418	115,756
November	1,896,483	72,942	4,430,309	131,935	3,134,321	120,551	3,121,149	124,846
December	1,630,395	62,707	3,300,416	132,017	2,863,266	114,531	3,569,251	137,279
Total	19,224,084	*61,814	34,568,418	*111,511	43,485,665	*139,825	36,811,157	*117,984

	—1925—		—1926—		—†1927—		—†1928—	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	4,193,281	155,307	4,132,210	158,931	3,789,874	145,764	3,990,902	153,496
February	3,752,352	156,348	3,785,051	157,710	3,812,046	158,835	4,043,457	161,738
March	4,194,340	161,321	4,468,617	165,504	4,535,272	167,973	4,507,217	166,934
April	3,583,676	137,834	4,105,799	157,915	4,127,335	158,744	4,305,382	172,215
May	3,454,971	132,883	3,927,979	151,076	4,047,251	155,663	4,207,212	155,823
June	3,204,451	123,248	3,734,153	143,621	3,495,609	134,446	3,743,903	143,996
July	3,084,472	118,634	3,634,993	139,807	3,204,135	128,165	3,805,598	152,224
August	3,420,998	131,577	3,986,966	153,345	3,498,549	129,576	4,178,610	154,763
September	3,489,565	134,214	6,913,383	150,515	3,268,881	125,726	4,147,893	165,916
October	3,888,814	144,030	4,074,544	156,713	3,316,292	127,550	4,649,968	172,220
November	3,902,900	156,116	3,705,744	142,529	3,127,015	120,270	4,266,835	164,109
December	3,970,918	152,728	3,466,766	133,337	3,175,484	122,134	4,018,208	160,728
Total	44,140,738	*141,932	46,936,205	*150,920	43,397,743	*139,543	49,865,185	*160,338

	—†1929—		—†1930—		—†1931—		—†1932—	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	4,500,131	166,672	3,778,235	139,935	2,512,140	93,042	1,484,991	57,115
February	4,328,713	180,363	4,035,111	168,130	2,547,027	106,126	1,481,253	59,250
March	5,068,176	194,930	4,254,331	163,620	3,054,339	117,475	1,433,337	53,087
April	4,950,053	190,387	4,109,492	158,057	2,766,959	106,421	1,259,629	48,447
May	5,286,246	195,787	3,982,915	147,515	2,551,633	98,140	1,125,243	43,279
June	4,902,955	196,118	3,418,535	136,741	2,127,762	81,837	912,757	35,106
July	4,850,583	186,561	2,922,220	112,393	1,887,580	72,599	806,722	32,269
August	4,939,086	182,929	3,060,763	117,722	1,716,829	66,032	846,730	31,360
September	4,527,887	181,115	2,840,379	109,245	1,545,411	59,439	991,858	38,148
October	4,534,326	167,938	2,692,539	99,724	1,590,180	58,896	1,087,508	41,810
November	3,521,111	135,427	2,212,220	88,489	1,591,644	63,666	1,032,221	39,701
December	2,903,012	116,120	1,979,547	76,136	1,301,211	50,047	861,034	33,117
Total	54,312,279	*174,638	39,286,287	*126,322	25,192,715	*81,006	13,322,833	*42,701

	—†1933—		—†1934—		—†1935—		—†1936—	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	1,016,870	39,110	1,997,129	73,968	2,870,161	106,302	3,045,946	112,813
February	1,073,012	44,709	2,211,944	92,164	2,774,271	115,595	3,964,418	118,577
March	898,236	33,268	2,798,440	103,646	2,865,292	110,204	3,342,619	128,562
April	1,335,422	53,817	2,936,064	117,443	2,640,602	101,562	3,942,254	151,625
May	1,976,428	73,201	3,399,494	125,907	2,633,661	97,543	4,046,253	155,625
June	2,564,420	98,632	3,059,483	117,672	2,258,664	90,347	3,984,845	153,263
July	3,168,354	126,734	1,489,453	59,578	2,267,827	87,224	3,922,731	150,874
August	2,863,569	106,058	1,381,350	51,161	2,915,930	107,997	4,195,130	161,351
September	3,283,079	87,811	1,268,977	50,759	2,825,004	113,000	4,161,108	160,043
October	2,084,894	80,188	1,481,902	54,885	3,142,759	116,398	4,545,001	168,333
November	1,521,189	58,507	1,610,625	61,947	3,150,409	121,170	4,337,412	173,496
December	1,798,606	71,944	1,964,257	78,570	3,073,405	122,936	.....	.....
Total	22,594,079	*72,884	25,599,118	*82,312	33,417,985	*107,453	‡42,487,717	*148,558

*Average. †Beginning with 1927, the Institute excludes crucible and electric ingots, which totaled 675,123 tons in 1927, 810,029 tons in 1928, 958,076 tons in 1929, 614,852 tons in 1930, 412,489 tons in 1931, 241,756 tons in 1932, 421,884 tons in 1933, 361,827 tons in 1934, and 542,134 tons in 1935. ‡Eleven months.

AVERAGE MONTHLY QUOTATIONS IN 1936

Base or furnace, unless otherwise specified; scrap, delivered to consumers

PITTSBURGH

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Structural Shapes	1.80c	1.80c	1.80c	1.80c	1.80c	1.80c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c
Plates	1.80	1.80	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.90	1.90	1.90
Bars	1.85	1.85	1.85	1.85	1.85	1.85	1.95	1.95	1.95	2.05	2.05	2.05
Cold-Finished Steel Bars	2.10	2.10	2.10	2.10	2.10	2.15	2.25	2.25	2.25	2.35	2.35	2.55
Strip, Hot-Rolled	1.85	1.85	1.85	1.85	1.85	1.85	1.95	1.95	1.95	1.95	1.95	1.95
Strip, Cold-Rolled	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Standard Spikes	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.75	2.75	2.75	2.85
Plain Wire	2.30	2.30	2.30	2.40	2.40	2.40	2.40	2.40	2.40	2.50	2.50	2.60
Structural Rivets	2.90	2.90	2.90	2.90	2.90	2.95	3.05	3.05	3.05	3.05	3.05	3.20
No. 24 Hot-Rolled Annealed Sheets	2.40	2.40	2.40	2.40	2.40	2.40	2.50	2.50	2.50	2.60	2.60	2.60
No. 9-10 Blue Annealed Sheets	1.85	1.85	1.85	1.85	1.85	1.85	1.95	1.95	1.95	1.95	1.95	1.95
No. 24 Galvanized Sheets	3.10	3.10	3.10	3.10	3.10	3.10	3.20	3.20	3.20	3.20	3.20	3.20
Tin Plate, base box	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
Wire Nails	2.40	2.40	2.15	2.10	2.10	2.10	2.10	2.10	1.95	2.05	2.05	2.20
Steel Pipe, 1 to 3-inch, % discount (base $200 per ton)	64%	64%	67.3%	69.5%	69.05%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%
Bessemer Pig Iron, Neville Island base	20.81	20.81	20.81	20.81	20.81	20.81	20.81	20.81	20.81	20.81	20.81	21.81
Basic Pig Iron, Neville Island base	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	20.00
No. 2 Foundry Pig Iron, Neville Island Base	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	20.50
Malleable Pig Iron, Neville Island base	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	20.50
Bessemer Ferrosilicon, 10 per cent (Jackson co. base)	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75	29.00
Billets, Bessemer and Open-Hearth	29.00	29.00	28.40	28.00	28.00	28.00	30.00	30.00	30.00	32.00	32.00	32.00
Sheet Bars, Bessemer and Open-Hearth	30.00	30.00	28.50	28.00	28.00	28.00	30.00	30.00	30.00	32.00	32.00	32.00
Wire Rods	40.00	40.00	40.00	40.00	40.00	38.80	38.00	38.00	38.00	40.00	40.00	40.00
Furnace Coke, spot	3.50	3.50	3.50	3.50	3.50	3.50	3.45	3.45	3.90	4.00	4.00	4.00
Foundry Coke, spot	4.00	4.20	4.10	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
Heavy Melting Steel Scrap	14.50	14.80	15.75	15.75	14.75	13.80	14.15	16.00	17.75	18.15	17.40	18.50
Low Phosphorus Scrap	17.00	17.25	17.95	17.90	17.20	15.90	17.40	18.75	20.25	20.50	20.90	22.00
No. 1 Cast Scrap	13.75	13.55	14.60	14.90	14.65	15.00	15.15	16.00	16.75	17.00	17.00	17.50

CHICAGO

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bars	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	2.00c	2.00c	2.00c	2.10c	2.10c	2.10c
Plates	1.85	1.85	1.85	1.85	1.85	1.85	1.95	1.95	1.95	1.95	1.95	1.95
Structural Shapes	1.85	1.85	1.85	1.85	1.85	1.85	1.95	1.95	1.95	1.95	1.96	1.95
Rail Steel Bars	1.75	1.75	1.75	1.75	1.75	1.75	1.85	1.85	1.85	1.95	1.95	1.95
Bar Iron*	1.80	1.80	1.80	1.80	1.80	1.80	1.90	1.90	1.90	2.00	2.00	2.00
No. 24 Hot-Rolled Annealed Sheets	2.50	2.50	2.50	2.50	2.50	2.50	2.60	2.60	2.60	2.70	2.70	2.70
*Terre Haute, Ind. base 5 cents less												
No. 2 Foundry and Malleable Pig Iron	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.50	$19.75	$20.50
Southern No. 2 Pig Iron, delivered	19.72	19.72	19.72	19.72	19.72	19.72	19.72	19.72	19.72	19.72	19.97	20.72
Lake Superior Charcoal Iron, delivered Chicago	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.87	26.75
Heavy Melting Steel Scrap	13.40	14.30	14.75	14.35	13.05	12.75	13.25	15.45	16.15	16.25	16.50	16.50
Steel Specialties, Chicago	14.45	15.75	16.25	15.85	14.65	14.40	14.75	16.65	17.65	17.75	18.25	18.75
Rails for Rolling	14.25	15.50	15.75	15.75	14.65	14.00	14.00	16.40	16.75	16.95	17.25	17.25
Car Wheels, Iron	13.45	14.25	14.75	14.35	13.50	13.50	13.50	15.65	16.25	16.65	16.75	17.25
No. 1 Machinery Cast Scrap	12.25	12.75	13.75	13.75	12.30	12.25	12.25	13.65	13.75	14.15	14.25	14.25

EASTERN PENNSYLVANIA

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tank Plates, delivered Philadelphia	1.99c	1.99c	1.99c	1.99c	1.99c	1.99c	2.09c	2.09c	2.09c	2.09c	2.09c	2.09c
Structural Shapes, delivered Philadelphia	2.015	2.015	2.015	2.015	2.015	2.015	2.115	2.115	2.115	2.115	2.115	2.115
Bars, delivered Philadelphia	2.16	2.16	2.16	2.16	2.16	2.16	2.26	2.26	2.26	2.36	2.36	2.36
Bar Iron, common, delivered Philadelphia	2.06	2.06	2.06	2.06	2.06	2.06	2.16	2.16	2.16	2.26	2.26	2.26
No. 10 Blue Annealed Sheets, delivered Philadelphia	2.16	2.06	2.08	2.16	2.16	2.21	2.26	2.26	2.26	2.26	2.26	2.26
Basic Pig Iron, delivered	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$20.81	$21.06	$21.81
No. 2X Foundry Pig Iron, delivered Philadelphia	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.93	22.68
Standard Low Phosphorus Pig Iron, delivered	25.13	25.13	25.13	25.13	25.13	25.13	25.13	25.13	25.13	25.13	25.38	26.13
No. 1 Heavy Melting Steel Scrap	$12.37	$13.15	$13.46	$13.75	$12.65	$11.70	$12.25	$13.85	$15.37	$15.65	$14.81	$16.50
No. 1 Railroad Wrought Scrap	12.50	13.20	14.00	14.25	13.45	13.25	13.75	14.65	15.31	16.00	15.75	16.00
No. 1 Cupola Cast Scrap	12.75	13.45	14.00	14.87	14.15	13.75	14.31	15.55	16.62	16.65	16.25	17.25

COAL TAR PRODUCTS

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Benzol, per gallon producers' plants, tank lots	18.00c	18.00c	18.00c	18.00c	18.00c	18.00c	18.00c	17.00c	16.00c	16.00c	16.00c	16.00c
Toluol, per gallon producers' plants, tank lots	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Solvent naphtha, per gallon producers' plants tank lots	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Phenol, per pound, producers' plants, in 200-lb. drums	16.30	16.30	16.30	16.30	16.30	16.30	15.50	15.50	15.50	15.50	15.50	15.50
Napthalene flakes, per pound, producers' plants	6.75	6.75	6.75	6.75	7.25	7.25	7.25	7.25	7.25	7.25	8.25	8.25
*Napthalene balls, per pound, producers' plants	6.75	6.75	6.75	6.75	7.25	7.25	7.25	7.25	7.25	7.25	8.25	8.25
Sulphate of Ammonia, per 100 lbs. Atlantic seaboard	$1.20	$1.20	$1.25	$1.27	$1.30	$1.28	$1.25	$1.25	$1.27	$1.27	$1.27	$1.30
*Western prices one-half cent higher.												

NONFERROUS METALS

Prompt, wholesale prices in cents per pound

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tin, Straits, spot, New York	47.213	47.941	48.008	46.961	46.345	42.157	43.013	42.549	44.727	44.940	51.347	51.375
Copper, electro, delivered Connecticut	9.250	9.250	9.250	9.394	9.500	9.500	9.587	9.750	9.750	9.808	10.432	10.519
Zinc, prime western, East St. Louis	4.850	4.861	4.900	4.900	4.900	4.881	4.785	4.801	4.850	4.850	4.982	5.342
Lead, open market, East St. Louis	4.350	4.365	4.450	4.450	4.450	4.450	4.450	4.450	4.450	4.491	4.964	5.234
Lead, open market, New York	4.500	4.515	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.641	5.114	5.384
Aluminum	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000
Antimony, Chinese, spot, New York	12.966	13.033	13.423	13.500	13.500	13.192	13.000	12.577	12.500	12.500	12.500	12.707
Nickel, cathodes	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000

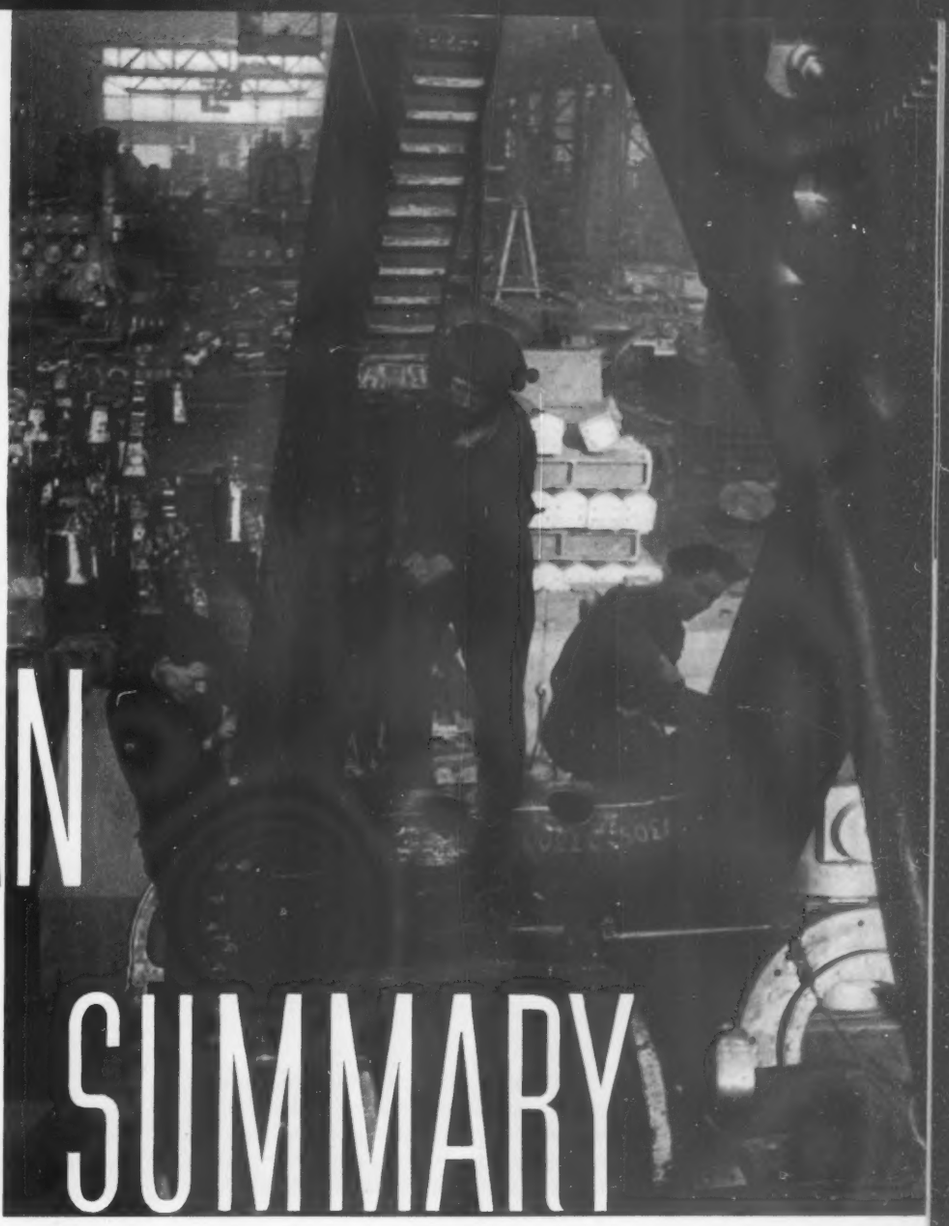
PIG IRON PRODUCTION, 1887-1937

Coke and Anthracite Iron in Gross Tons; Annual Statistics by American Iron and Steel Institute, Monthly Statistics by STEEL

Year	Tons	Year	Tons	Year	Tons	Year	Tons	Year	Tons	Year	Tons
1887	5,900,914	1892	8,619,379	1897	9,397,469	1902	17,431,138	1907	25,343,964	1912	29,379,912
1888	5,955,105	1893	6,737,713	1898	11,477,184	1903	17,503,568	1908	15,686,872	1913	30,626,171
1889	7,028,374	1894	6,434,966	1899	13,335,937	1904	16,157,504	1909	25,419,468	1914	23,068,320
1890	8,574,558	1895	9,220,967	1900	13,404,760	1905	22,639,452	1910	26,907,060	1915	29,620,061
1891	7,702,906	1896	8,311,833	1901	15,494,913	1906	24,874,184	1911	23,370,871	1916	39,062,386

	Stacks		Output		Stacks		Output		Stacks		Output		Stacks		Output	
	No.	In	Total	Av. daily	No.	In	Total	Av. daily	No.	In	Total	Av. daily	No.	In	Total	Av. daily
	1917				**1918**				**1919**				**1920**			
Jan.	422	310	3,159,839	101,930	435	294	2,403,227	77,533	435	330	3,306,279	106,654	432	285	3,012,373	97,172
Feb.	422	317	2,649,935	94,641	435	319	2,318,242	82,723	435	311	2,943,347	105,120	432	305	2,984,257	102,904
March	423	331	3,255,813	105,026	438	338	3,209,996	103,548	435	279	3,088,023	99,614	433	315	3,375,768	108,895
April	425	333	3,328,061	110,936	437	351	3,273,355	109,112	435	216	2,474,374	82,479	433	278	2,752,670	91,754
May	425	340	3,413,677	110,119	437	360	3,451,884	111,351	433	197	2,107,729	67,991	433	297	2,991,825	96,510
June	427	347	3,260,234	108,675	437	353	3,316,148	110,538	433	199	2,114,028	70,467	433	302	3,046,623	101,553
July	429	351	3,337,442	107,659	437	364	3,408,584	109,954	434	240	2,424,212	78,200	434	291	3,043,918	98,190
Aug.	431	357	3,238,970	104,483	438	371	3,378,479	108,983	432	266	2,742,081	88,453	434	306	3,145,536	101,468
Sept.	431	342	3,140,742	104,691	438	364	3,413,223	113,774	432	163	2,480,790	82,692	434	317	3,124,308	104,143
Oct.	433	354	3,296,286	106,332	437	364	3,482,392	112,335	432	216	1,864,424	60,142	435	290	3,288,341	106,075
Nov.	434	344	3,198,597	106,620	437	360	3,347,844	111,595	432	252	2,407,369	80,244	435	255	2,935,081	97,836
Dec.	435	321	2,885,380	93,077	435	351	3,434,114	110,778	431	262	2,626,074	84,711	435	202	2,700,268	87,105
Total			38,164,976	*104,561			38,437,488	*105,308			30,578,730	*83,777			36,400,968	*99,456
	1921				**1922**				**1923**				**1924**			
Jan.	435	184	2,414,753	77,895	430	127	1,645,804	53,099	428	261	3,228,226	104,136	414	248	3,015,480	97,273
Feb.	436	155	1,929,394	68,906	429	139	1,630,180	58,220	424	278	2,993,918	106,925	414	263	3,073,619	105,987
March	436	103	1,594,866	51,447	429	155	2,035,908	65,674	424	295	3,523,595	113,664	410	269	2,465,389	111,787
April	436	96	1,190,751	39,691	429	161	2,070,161	69,005	423	311	3,546,308	118,210	410	234	3,226,107	107,537
May	436	90	1,215,272	39,202	427	175	2,309,348	74,495	423	322	3,868,486	124,790	411	187	2,619,986	84,515
June	436	74	1,064,007	35,466	427	191	2,362,455	78,748	424	322	3,667,868	122,262	411	158	2,022,836	67,427
July	435	69	864,642	27,892	427	170	2,403,030	77,517	418	299	3,684,677	118,860	411	145	1,783,457	57,531
Aug.	435	69	954,901	30,802	427	143	1,810,665	58,408	418	270	3,448,886	111,254	411	150	1,882,986	60,741
Sept.	435	84	985,795	32,859	427	189	2,024,008	67,466	418	254	3,117,526	103,917	411	174	2,053,617	68,454
Oct.	435	95	1,234,450	39,821	428	218	2,629,655	84,827	418	245	3,142,646	101,375	411	182	2,461,727	79,410
Nov.	429	120	1,414,958	47,165	428	241	2,846,110	94,870	418	229	2,891,191	96,373	411	204	2,514,979	83,832
Dec.	429	123	1,642,775	52,992	428	253	3,083,520	99,468	418	231	2,912,527	93,952	411	229	2,956,389	95,367
Total			16,506,564	*45,223			26,850,844	*73,563			40,025,850	*109,659			31,076,572	*84,908
	1925				**1926**				**1927**				**1928**			
Jan.	411	251	3,372,207	108,781	386	225	3,319,789	107,089	369	210	3,101,346	100,043	353	184	2,855,515	92,113
Feb.	411	256	3,214,067	114,788	382	223	2,923,850	104,423	369	217	2,940,604	105,021	353	186	2,898,668	99,954
March	410	246	3,571,422	115,207	377	235	3,458,171	111,554	365	223	3,482,107	112,326	350	197	3,199,175	103,199
April	409	221	3,211,235	107,041	376	237	3,438,805	114,627	364	221	3,424,377	114,146	349	195	3,181,975	106,066
May	405	196	2,933,907	94,642	376	229	3,477,820	112,187	363	211	3,391,067	109,388	345	199	3,292,790	106,219
June	399	191	2,679,045	89,301	372	220	3,232,478	107,749	362	198	3,089,726	102,991	343	189	3,082,340	102,745
July	397	188	2,665,262	85,976	372	217	3,224,663	104,021	362	190	2,954,625	95,311	342	185	3,072,711	99,120
Aug.	392	192	2,707,171	87,328	372	215	3,200,723	103,249	362	189	2,950,674	95,183	340	183	3,136,995	101,193
Sept.	388	200	2,725,885	90,862	372	216	3,163,269	105,442	362	181	2,782,500	92,750	340	194	3,063,593	102,120
Oct.	387	209	3,017,889	97,351	374	218	3,334,206	107,555	361	174	2,812,015	90,712	338	196	3,373,539	108,824
Nov.	386	220	3,023,257	100,775	375	216	3,237,992	107,933	359	171	2,661,863	88,728	337	194	3,304,656	110,155
Dec.	386	234	3,249,057	104,808	369	203	3,089,175	99,651	354	169	2,698,208	87,039	335	198	3,369,784	108,702
Total			36,370,404	*99,645			39,100,941	*107,126			36,289,112	*99,422			37,831,741	*103,365
	1929				**1930**				**1931**				**1932**			
Jan.	328	202	3,433,028	110,742	314	173	2,838,751	91,573	309	102	1,715,443	55,337	298	61	971,437	31,336
Feb.	326	208	3,218,376	114,942	314	180	2,845,937	101,640	307	109	1,711,192	61,114	298	64	960,550	33,122
March	326	213	3,709,518	119,662	314	184	3,252,822	104,930	307	116	2,028,906	65,448	298	60	967,015	31,194
April	326	216	3,663,167	122,106	314	182	3,191,119	106,371	307	113	2,009,582	66,986	297	59	855,734	28,524
May	325	220	3,898,344	125,753	314	180	3,241,477	104,564	307	105	1,995,001	64,355	297	54	783,769	25,282
June	325	220	3,715,104	123,837	312	162	2,934,508	97,817	303	91	1,637,998	54,599	297	47	626,015	20,867
July	325	217	3,782,511	122,016	312	144	2,638,441	85,110	303	82	1,462,270	47,170	297	45	570,222	18,394
Aug.	325	209	3,746,198	120,845	312	137	2,525,105	81,455	303	75	1,279,205	41,264	297	41	528,105	17,035
Sept.	323	204	3,496,454	116,548	310	126	2,276,781	75,893	303	74	1,168,436	38,947	295	46	593,640	19,788
Oct.	318	203	3,588,146	115,747	310	111	2,165,374	69,851	303	69	1,172,781	37,831	292	50	644,648	20,795
Nov.	317	176	3,182,420	106,081	310	107	1,865,458	62,182	302	67	1,101,820	36,727	292	51	625,753	20,858
Dec.	316	156	2,836,917	91,513	310	95	1,665,715	53,732	301	57	980,377	31,625	291	42	547,179	17,650
Total			42,270,183	*115,808			31,441,488	*86,141			18,263,011	*50,035			8,674,067	*23,699
	1933				**1934**				**1935**				**1936**			
Jan.	291	45	568,785	18,348	289	86	1,225,643	39,537	281	89	1,478,443	47,692	267	118	2,029,304	65,461
Feb.	291	44	553,067	19,752	289	90	1,270,792	45,385	281	96	1,614,905	57,675	266	120	1,838,932	63,411
March	291	38	542,013	17,484	289	97	1,625,588	52,438	280	97	1,770,990	57,120	265	126	2,046,121	66,004
April	291	48	623,606	20,786	285	109	1,736,217	57,873	278	97	1,671,556	55,719	265	143	2,409,474	80,316
May	290	61	892,326	28,784	284	117	2,057,471	66,370	275	96	1,735,577	55,986	253	145	2,659,643	85,795
June	289	90	1,264,953	42,165	283	92	1,936,897	64,563	272	91	1,558,463	51,949	253	144	2,596,528	86,551
July	289	105	1,801,345	58,108	282	74	1,228,544	39,630	270	92	1,520,340	49,043	252	146	2,595,791	83,735
Aug.	289	98	1,833,265	59,137	282	61	1,060,187	34,199	270	98	1,759,782	56,767	248	148	2,711,726	87,475
Sept.	289	89	1,507,931	50,264	282	61	899,075	29,969	270	104	1,770,259	59,009	247	154	2,728,257	90,942
Oct.	289	81	1,358,540	43,824	282	65	951,353	30,689	269	116	1,978,379	63,818	245	161	2,991,794	96,509
Nov.	289	77	1,083,740	36,124	281	60	957,906	31,930	268	122	2,066,293	68,876	245	165	2,949,942	98,331
Dec.	289	74	1,192,136	38,456	281	67	1,028,006	33,161	268	120	2,115,496	68,242	...	...	.....	.....
Total			13,221,707	*36,223			15,977,679	*43,774			21,040,483	*57,694			†27,557,512	*82,261

*Average †Eleven months.



ASSEMBLING a 5-cubic meter steam shovel in mechanical shop No. 1 of the Ural Machine Building plant near Sverdlevek, Russia. Industry in the Soviet has been accelerated to the point where some observers estimate the country now ranks second only to the United States in industry and commerce. Sovfoto

BY VINCENT DELPORT
European Manager, STEEL

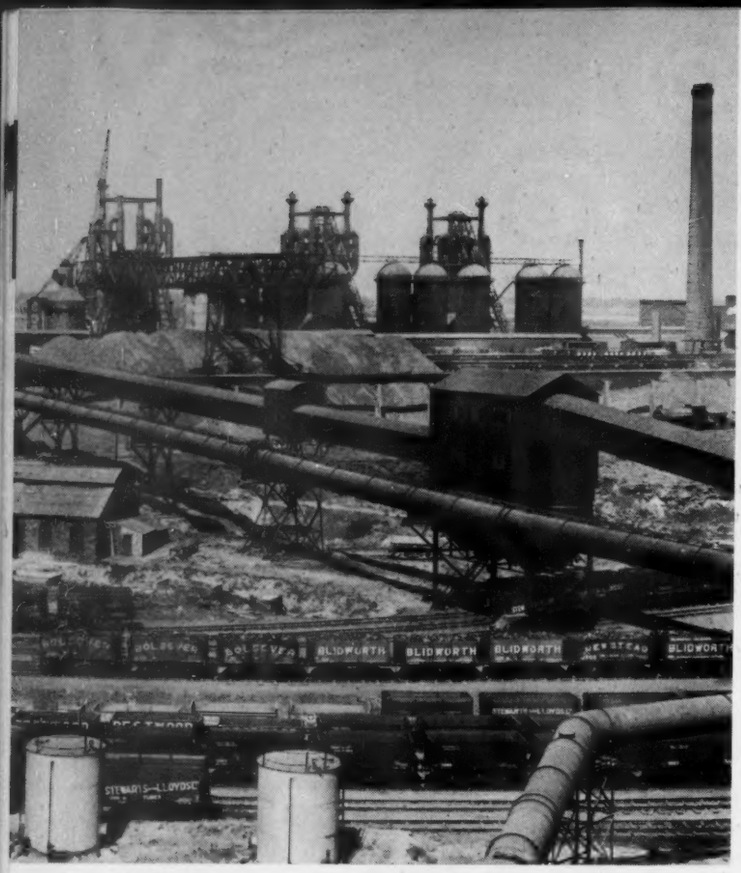
EUROPEAN MARKET SUMMARY

Industries Abroad React to Effects of Political and Sociological Developments

PARALLEL with the increase of production recorded on another page, activities of the iron and steel markets of Europe developed considerably during 1936. This revival was, to a large extent, confined to the domestic market of a number of industrial countries, trade developments in a few cases having been retarded by social and political disturbances.

Export markets also tended to show greater activity than in 1935, but in the case of Great Britain, one of the leading exporting countries to overseas markets, export trade was restricted in favor of the home market. Germany, on the other hand, was able substantially to increase her exports, particularly to Eastern Europe. France, until the end of the year, was handicapped in her export trade by the high cost of production prevailing in that country, as measured in gold francs.

The various international syndicates, which control the export trade of the leading steel products, operated satisfactorily on the whole, and participation of Great



VIEW of blast furnaces at the vast plant of Stewarts and Lloyds at Corby, England. Note unusual types of gondola cars in the foreground. Photo courtesy H. A. Brassert & Co. Ltd., London

Britain in the Continental agreement added to the stability of the entire structure. As a result, there were few price variations throughout the greater part of the year, at least insofar as basic gold prices were concerned. These are f.o.b. prices, which are taken as the starting point for the c.i.f. prices that are fixed periodically for the various world markets by the controlling boards. Fluctuations naturally occurred in the c.i.f. prices, owing mainly to variations in exchange rates and in freight rates. Toward the end of the year, however, basic prices tended to stiffen, and this tendency materialized particularly as regards plates and sheets.

A FEATURE of the year in regard to export trade was the larger share of this trade taken by Russia, especially in exports of pig iron. Another aspect of the case is that Russia gradually is becoming closed as a market for iron and steel from other countries. Steel production in the Soviet for 1936 soared to the astounding total of almost 16,000,000 tons. Meantime Russia is now estimated to be the largest exporter of pig iron in the world, shipping somewhere near 700,000 tons for the year, and accounting for approximately 32 per cent of the world total for export shipments, compared with about 9 per cent in 1934.

During the past year, little progress was made in breaking down artificial trade barriers; while tariffs have tended to be less drastic, currency regulations enforced by certain countries remain as rigid as ever, with the result that bartering iron and steel products against other commodities is no uncommon procedure. The Abyssinian war early in the year and the civil war in Spain in the latter part of 1936 also had a disturbing influence on export trade in certain markets.

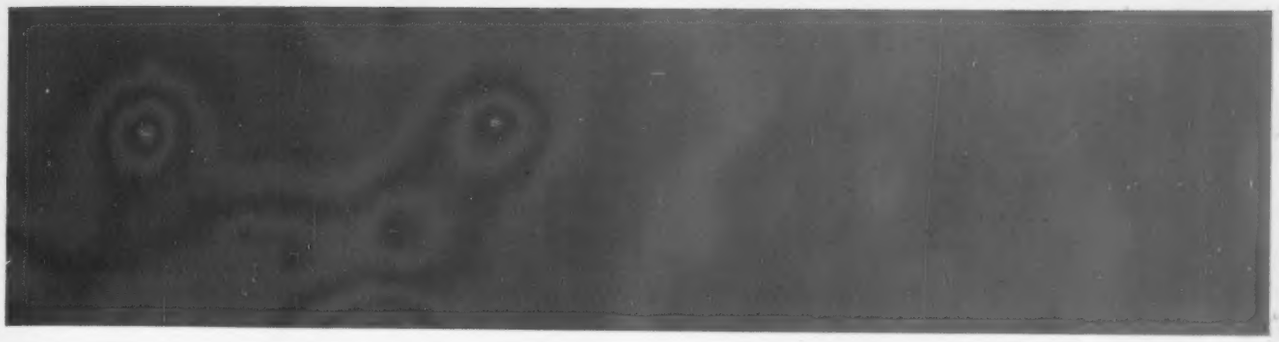
DOMESTIC markets of most European countries were more active in 1936 than in previous years. Great Britain probably saw the most considerable development of home trade. As the year drew to its end, consumers found it more and more difficult to place orders for normal delivery, and the quota of Continental imports allowable at a reduced tariff rate had to be increased on more than one occasion, particularly as regards semifinished steel.

This rapid rise of prosperity in Great Britain had the unfavorable effect of curtailing the tonnage of steel available for export; competing nations were keen to take advantage of the situation and Britain is faced with the risk of losing her hold on certain markets, although her participation in the Continental cartels should mitigate the risk. Another aspect of the situation was the increase in iron and steel prices which, although gradual, was quite noticeable from one end of the year to the other. The average monthly prices given in our tables illustrate this point. Great Britain started the new year with order-books filled for at least two months and prospects of a still further developing demand that should last well into the year.

CONDITIONS in Germany also were active, but a large proportion of contracts in that country was obtained directly or indirectly from the government for public works, national defense, etc. Production, to a large extent, is controlled as regards wages and raw materials by centralized authorities who are themselves under government supervision. Throughout the year selling prices fixed by the various national syndicates remained invariable, and as long as the authorities responsible for the maintenance of Germany's economic structure can carry on, the steel industry's activities will not lag.

OF THE major countries of Europe, France experienced the most troubled year in 1936, and to some extent France's neighbor, Belgium, was affected. The social and political unrest which prevailed in France is common knowledge. Business revival was strangled by lack of confidence on the part of consumers, and it was only when it became evident that prices would rise on account of the effects of the new social laws and the franc devaluation that a definite buying movement set in. During the second half of the year, prices did rise considerably, not, as in Great Britain, because of a greater demand, but in order to meet higher production costs. Conditions in France are still unstable and the outlook for the immediate future is uncertain.

The remaining steel producing countries of Europe enjoyed a relatively good year in 1936. Production and exchange of goods became intensified, and the prospects of the near future are not unfavorable to continuance of these activities. From the point of view of iron and steel production and trade, Russia is becoming a more and more important factor and may eventually counteract the influence of Britain and France at the other end of Europe, and Germany in the center.



European Iron and Steel Export Prices, 1936

F. O. B. Ports of Shipment

BRITISH PRICES IN POUNDS STERLING PER GROSS TON

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry, No. 3, Middlesbrough	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6
Basic, Middlesbrough	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6	3- 2-6
Hematite, East Coast	3- 5-0	3- 9-6	3-11-0	3-11-0	3-11-0	3-14-6	3-14-6	3-14-9	3-15-0	3-15-0	3-15-0	3-15-0
SEMIFINISHED STEEL												
Billets	5-10-0	5-11-9	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6
Wire rods	8-10-0	8-10-0	8-12-3	8-19-0	8-19-0	8-19-0	8-19-0	8-19-0	8-19-0	8-19-0	8-19-0	8-19-0
FINISHED STEEL												
Standard rails	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0
Merchant bars	7-10-0	7-10-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	8- 6-3	8-10-0	8-10-0	8-10-0	8-10-0
Structural shapes	7-10-0	7-10-0	7-10-0	7-10-0	7-10-0	7-10-0	7-10-0	8- 1-3	8- 5-0	8- 5-0	8- 5-0	8- 5-0
Plates, ship, bridge and tank	8- 1-3	8- 1-3	8- 1-3	8- 1-3	8- 1-3	8- 1-3	8- 1-3	8 -9-8	8-12-6	8-12-6	8-12-6	8-12-6
Sheets, black, 24-gage	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-17-6	10- 0-0	10- 5-0	10- 5-0	10- 5-0
Sheets, galvanized, 24-gage, corrugated	11-15-0	11-15-0	11-15-0	11-15-0	11-15-0	11-15-0	11-15-0	11-15-0	11-15-0	12- 2-6	12-12-6	12-15-0
Hoops and bands	8-10-0	8-10-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-17-6	9- 5-0	9- 5-0	9- 5-0	9- 5-0
Plain wire, base	9- 5-0	9- 5-0	9-10-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0
Galvanized wire, base	10-15-0	10-15-0	11- 2-6	11-10-0	11-10-0	11-10-0	11-10-0	11-10-0	11-10-0	11-10-0	11-10-0	11-10-0
Wire nails, base	12- 0-0	12- 0-0	12- 0-0	12- 0-0	12- 0-0	12- 0-0	12- 0-0	12- 0-0	12- 0-0	12 -0-0	12- 0-0	12- 0-0
Tinplate, base box 108 pounds	18-9	18-9	18-9	18-9	18-9	18-9	18-9	18-9	18-9	18-9	18-9	18-9
Ferromanganese—delivered Atlantic seaboard, duty-paid	$75	$75	$75	$75	$75	$75	$75	$75	$75	$75	$75	$75

CONTINENTAL PRICES IN GOLD POUNDS PER METRIC TON

F. O. B. Channel or Northern Seaports

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry, Silicon, 2.50-3.00	1-13-6	1-13-0	1-14-6	1-15-0	1-15-0	1-15-0	1-15-0	1-15-0	1-15-0	1-15-0	1-15-0	1-15-0
Basic bessemer	1-10-6	1-10-0	1-10-0	1-10-0	1-10-0	1- 9-6	1- 9-6	1- 9-0	1- 9-0	1- 9-0	1- 9-0	1- 9-0
SEMIFINISHED STEEL												
Billets	2- 7-0	2- 7-0	2- 7-0	2- 7-0	2- 7-0	2- 7-0	2- 7-0	2- 7-0	2- 7-0	2- 7-0	2- 7-0	2- 7-0
Wire rods	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0
FINISHED STEEL												
Standard rails	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0
Merchant bars	3- 3-9	3- 3-9	3- 3-9	3- 3-9	3- 3-9	3- 3-9	3- 3-9	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0
Structural shapes	3- 1-6	3- 1-6	3- 1-6	3- 1-6	3- 1-6	3- 1-6	3- 1-6	3- 1-6	3- 1-6	3- 1-6	3- 1-6	3- 1-6
Plates, 5 millimeters	4- 5-0	4- 5-0	4- 5-0	4- 5-0	4- 5-0	4- 5-0	4- 5-0	4- 5-0	4- 5-0	4- 5-0	4- 5-9	5- 0-0
Sheets, black, 24-gage, close-annealed	5-16-0	5-16-0	5-16-0	5-16-0	5-16-0	5-16-0	5-17-3	6- 5-6	6-10-0	6- 7-6	6- 5-0	6- 5-0
Sheets, galvanized, 24-gage, corrugated	6- 5-0	6- 5-0	6- 5-0	6- 5-0	6- 5-0	6- 0-0	6- 3-9	6-13-9	7- 0-0	7- 2-6	7- 5-0	7-10-0
Hoops and bands	4- 0-0	4- 0-0	4- 0-0	4- 0-0	4- 0-0	4- 0-0	4- 0-0	4- 0-0	4- 0-0	4- 0-0	4- 0-0	4- 0-0
Plain wire, base	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0
Galvanized wire, base	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6	5-17-6
Wire nails, base	4-15-0	4-15-0	4-15-0	4-15-0	4-15-0	4-15-0	4-15-0	4-15-0	4-15-0	4-15-0	4-15-0	4-15-0

British Steel Industry Moves Up to Record Production

BY J. A. HORTON,
British Correspondent

BRITISH steel, after a definite step forward in 1934, has maintained progress in the two succeeding years until, at the beginning of 1937, the industry stands firmly intrenched, with order-books bulging for many months ahead. In fact, the record of 1935, best year since the slump, has easily been surpassed.

Pronounced trade development can be forecast for the current year, although it is clear productive capacity of existing plant already has been severely taxed. Bear in mind, however, that steel manufacturers have been dealing with business which has come as a direct result of Britain's armament program, in addition to the vast expansion of home trade.

The time must come when armament orders will be completed, and a timely warning was given by the president of the board of trade, Walter Runciman, recently on this very point. There was a temptation, he pointed out, to fill order-books with profitable and safe domestic business to the exclusion of export trade. That, however, would be a shortsighted policy, and industrialists should take the long view, that export trade should be maintained and expanded.

Considerable business for the steel industry emanated from the building and engineering trades. At the end of 1935 there had been an increase in the use of constructional steel of some 10 per cent compared with 1934. The increase in constructional engineering work in progress throughout 1936 certainly exceeded anything experienced in either of the two preceding years. Engineering concerns throughout the country are responsible for a large proportion of the steel now being produced, and it is admitted that there is work in contemplation over a period extending in some cases to as much as nine months.

Shipyard Tonnage Bulks Impressively

Much larger quantities of material are being taken in the shipbuilding industry and, although somewhat belated, progress in shipyards is now substantial and one of the most encouraging items in the industrial situation. Britain has not recovered the high position she occupied in prewar days, since of the world tonnage under construction, only 44 per cent is in hand in Great Britain and Northern Ireland, compared with the 60 per cent proportion of world output before the war.

For the quarter ended September, 1936, the merchant vessel tonnage under construction showed an increase of 79,839 tons in comparison with the previous three months, but taken over a long period, the figures are more striking, as the total amount under construction Sept. 30 was 928,571 tons, or 398,017 tons more than at the corresponding date in the previous year, and that figure was higher than for any quarter in a period of six years. A similar conclusion is drawn from the figures of tonnage launched during the year and the returns of new ships laid down.

The automobile industry has also made a considerable contribution in the recovery in steel. There has been a vast increase in output, constituting a record in the last twelve months. Those in authority are confident of steadily-increasing prosperity in this branch and are planning works extensions at considerable expense to meet the demands of what they believe will be an extended period of prosperity.

New high records have been achieved in British steel output, the September and October figures for steel ingots and castings having exceeded a million tons. The monthly average was something like 968,000 tons (an all-time record), compared with 820,000 tons in the preceding year, whereas in 1933 the average fell as low as 585,300 tons.

Furnace Operators Worried by Coke Scarcity

Pig iron production did not expand to the same extent, and the September figure of 650,800 tons fell short of the year's previous highest figure of 665,600 tons in July. As already indicated, producers are confident as to the future, and extensions of plant are being made to meet a growing demand, although in this respect a cautious policy has necessarily to be pursued, and industrialists do not wish to bring into being conditions in which the industry would be handicapped by overproduction. The number of furnaces in blast at the end of October was 113, compared with about 100 in January, 1936.

The question of an adequate supply of fuel at a reasonable cost has exercised the minds of pig iron producers over a considerable period. Several additional furnaces have been prepared for relighting, and the fact that they are not already in operation is attributed to the scarcity and high cost of coke, a factor which persisted throughout the year and is a problem still awaiting solution. Steel scrap has been used increasingly, and imports of this material have been something like three times as much as in the previous year.

It is a remarkable feature of the course of the

British Production Summary for 1936

(Gross tons 000 omitted)

	PRODUCTION				IMPORTS			EXPORTS		
Mo. ave.	Coal	Pig iron, ferro-alloys	No.* fur-naces in blast	Steel ingots and cast-ings	Iron ore	Pig iron, ferro-alloys	Steel†	Fur-nace coke	Pig iron, ferro-alloys	Steel†
1913...	23,951	855	338	639	603	18.0	168	...	93.7	320
1933...	17,259	345	81	585	226	10.2	71	123	9.3	151
1934...	18,394	498	96	738	363	13.6	100	115	11.1	177
1935...	18,578	535	102	820	379	10.7	85	132	13.2	185
1936...										
Jan....	21,559	596	109	912	483	11.2	109	129	8.2	159
Feb....	19,640	585	109	938	436	15.1	108	114	7.1	163
Mar....	19,982	634	109	980	507	13.5	117	104	7.6	158
April...	17,908	630	112	984	464	14.0	107	87	9.9	170
May...	18,694	661	112	963	523	25.5	92	80	9.2	198
June...	16,865	644	112	966	462	17.6	93	91	8.0	168
July...	18,187	666	110	974	546	25.5	145	133	12.8	205
Aug....	17,056	636	109	873	550	31.2	111	122	10.1	156
Sept....	18,805	651	111	1,027	526	64.9	100	131	10.8	176
Oct.....	20,020	670	113	1,060	498	29.5	72	176	9.8	188
Mo. ave.	18,872	637	...	968	499	24.7	105	117	9.3	174

*Average for 1913; on last day of year or month for subsequent figures.
†Includes iron castings, but scrap excluded.

market during the revival which has taken place that the increase in steel prices has been comparatively small, for it must be recognized that had it not been for the strict control exercised by the British Iron and Steel federation, prices would have soared as they have always done under boom conditions such as those which obtain at the present time.

When the Heavy Steel association advanced its prices in May by about 12s 6d a ton for plates, beams and sections, it constituted the first advance in prices since 1929. Further discussions have taken place since that date with a view to raising values to a higher level, but so far nothing has been done. The rebate system, under which preference is given to buyers who take British steel exclusively, has been extended to other branches of the market, such as hematite, although in the case of the latter a scheme introduced in July was designed rather as a safeguard against demoralization of the British market by foreign raiding than as a concession to consumers.

However, a comparison of prices with those of a year ago justifies the statement already made that market stability is being jealously guarded by the government, acting in conjunction with the British Iron and Steel federation, so much so that there is scarcely any branch of the industry which is not subject to over-ruling authority.

Beginning with raw materials, the records of the last twelve months show that coke has advanced 7s a ton, and pig iron about 10s. Galvanized sheets have been raised by 25s for the export market, and semifinished steel, such as soft billets, has advanced by something under that amount.

At one stage it was feared that a shortage of semifinished steel would constitute a severe handicap in the proper functioning of the industry, but

European Iron and Steel Domestic Prices, 1936

At Works or Furnace

BRITISH PRICES IN POUNDS STERLING PER GROSS TON

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
Foundry pig iron, Silicon 2.50-3.00*	3–10–0	3–10–0	3–10–0	3–10–0	3–10–0	3–10–0	3–15–0	3–15–0	3–15–0	3–15–0	3–15–0	4– 1–0
Basic pig iron*	3–10–0	3–10–0	3–10–0	3–10–0	3–12–6	3–15–0	3–15–0	3–15–0	3–15–0	3–15–0	3–15–0	4– 1–0
Furnace coke	19–9	19–6	1– 0–0	1– 1–0	1– 1–9	1– 2–6	1– 2–0	1– 1–6	1– 1–6	1– 1–6	1– 1–6	1– 1–6
Billets	5–10–0	5–12–0	5–17–6	5–17–6	5–17–6	6– 2–6	6– 2–6	6– 2–6	6– 2–6	6– 2–6	6– 2–6	6– 2–6
Standard rails	8– 5–0	8– 5–0	8– 5–0	8– 5–0	8– 5–0	8– 5–0	8– 5–0	8– 5–0	8– 5–0	8– 5–0	8– 5–0	8– 5–0
Merchant bars	8–12–0	8–14–3	9– 1–0	9– 1–0	9– 1–0	9– 7–0	9– 7–0	9– 7–0	9– 7–0	9– 7–0	9– 7–0	9– 7–0
Shapes†	8–15–0	8–15–0	8–15–0	8–15–0	8–15–0	9– 7–6	9– 7–6	9– 7–6	9– 7–6	9– 7–6	9– 7–6	9– 7–6
Plates, ship, bridge and tank†	9– 1–3	9– 1–3	9– 1–3	9– 1–3	9–13–9	9–13–9	9–13–9	9–13–9	9–13–9	9–13–9	9–13–9	9–13–9
Sheets, black, 24-gage	11–10–0	11–10–0	11–10–0	11–10–0	11–10–0	11–10–0	11–10–6	12– 0–0	12– 0–0	12– 0–0	12– 0–0	12– 0–0
Sheets, galvanized, 24-gage, corrugated	13–10–0	13–10–0	13–10–0	13–10–0	13–10–0	13–10–0	13–12–6	14– 0–0	14– 0–0	14– 0–0	14– 0–0	14– 0–0
Plain wire	9– 5–0	9– 5–0	9–10–0	9–15–0	9–15–0	9–15–0	9–15–0	9–15–0	9–15–0	10– 0–0	10– 0–0	10– 0–0
Hoops and bands	9– 7–0	9– 9–3	9–16–0	9–16–0	9–16–0	10– 2–0	10– 2–0	10– 2–0	10– 2–0	10– 2–0	10– 2–0	10– 2–0

*Delivered Middlesbrough.

†Rebates of 15s. per ton for shapes & plates and 22s. 6d. for beams are obtainable in the home trade when the purchaser undertakes to buy only British steel, except in authorized cases.

GERMAN PRICES IN REICHSMARKS PER METRIC TON

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry pig iron, Silicon 2.50-3.00	63	63	63	63	63	63	63	63	63	63	63	63
Hematite pig iron	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50
Furnace coke	19	19	19	19	19	19	19	19	19	19	19	19
Billets	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50
Standard rails	132	132	132	132	132	132	132	132	132	132	132	132
Merchant bars	110	110	110	110	110	110	110	110	110	110	110	110
Shapes	107	107	107	107	107	107	107	107	107	107	107	107
Plates, 5 millimeters	127	127	127	127	127	127	127	127	127	127	127	127
Sheets, black, 1 to 3 millimeters, base	144	144	144	144	144	144	144	144	144	144	144	144
Sheets, galvanized, 24-gage, corrugated	370	370	370	370	370	370	370	370	370	370	370	370
Plain wire	173	173	173	173	173	173	173	173	173	173	173	173
Hoops and bands	127	127	127	127	127	127	127	127	127	127	127	127

FRENCH PRICES IN FRENCH FRANCS PER METRIC TON

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry pig iron, Silicon 2.50-3.00	260	260	260	260	260	260	282	290	290	290	315	350
Basic bessemer pig iron	190	190	190	190	190	190	200	210	210	210	225	245
Furnace coke	95	95	95	95	95	95	104	104	104	104	127	127
Billets	430	430	430	430	430	430	450	457	457	474	480	507
Standard rails	671	671	671	671	671	671	671	671	671	691	711	711
Merchant bars	560	560	560	560	560	560	612	630	630	655	665	695
Shapes	550	550	550	550	550	550	602	620	620	640	650	680
Plates, 5 millimeters	700	700	700	700	700	700	765	790	790	820	830	875
Sheets, black, 2 millimeters	600	600	600	600	600	600	637	800	810	885	1000	1150
Sheets, galvanized, 0.6-millimeter, corr.	950	950	950	950	1000	1000	1000	1100	1300	1375	1500	1650
Plain wire	900	900	900	900	950	950	1000	1100	1100	1125	1150	1190
Hoops and bands	650	650	650	650	650	650	714	735	735	760	770	790

BELGIAN PRICES IN BELGIAN FRANCS PER METRIC TON

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry pig iron, Silicon 2.50-3.00	385	385	395	405	410	410	440	450	450	460	460	490
Basic bessemer pig iron	350	350	350	350	350	350	360	370	385	395	425	435
Furnace coke	122	122	122	122	122	137	137	137	137	137	137	137
Billets	540	548	555	555	555	555	555	580	580	580	580	580
Standard rails	1100	1100	1000	1100	1100	1100	1150	1150	1150	1150	1150	1150
Merchant bars	600	625	650	650	650	650	650	700	700	700	700	700
Shapes	600	625	650	650	650	650	650	700	700	700	700	700
Plates, 5 millimeters	700	750	800	800	800	800	800	850	850	850	850	850
Sheets, black, 3 millimeters, basis	825	850	875	875	875	875	875	925	925	925	925	925
Galvanized sheets, corrugated, 0.5-milli.	1500	1500	1500	1500	1500	1500	1500	1500	1500	1900	1900	1900
Plain wire	1150	1150	1150	1150	1150	1150	1150	1250	1250	1250	1300	1300
Hoops and bands	800	800	800	800	800	800	800	850	850	850	850	850

here again the iron and steel federation stepped in and made arrangements with continental producers to send over supplies pending development of greater productive capacity in Britain. It is not surprising under these circumstances that the tonnage of semi-finished steel imported up to the end of September reached a figure more than double that recorded in the first three quarters of 1935. It is clear that without these special arrangements British makers would have been unable to cope with the urgent requirements of re-rollers and consumers.

Turning to exports of iron and steel, these have slowly increased since the beginning of 1936, but they have not reached the figures of the previous year. It is believed that more material could have been sold to overseas consumers, but it could not be spared, owing to the exceptionally heavy calls of the domestic market. In the third quarter of 1935, iron and steel exports totaled 576,693 tons, and in the corresponding quarter of 1936 the total was 563,111.

Demand Forces Waiving of Quota System

On the other hand, imports of iron and steel increased appreciably in the third quarter. Such an increase would have been impossible had the arrangements of the quota system been adhered to, but as this scheme was designed in the interests of the domestic market, to enforce the restrictions would have been detrimental to the interests of those they were designed to serve. Imports in the third quarter of 1936 amounted to 477,445 tons, compared with 253,851 tons in the same period of 1935. The tendency to increase will probably continue, owing to the urgent necessity of supplying re-rollers with material.

The introduction of a licensing system as a result of negotiations between the British Iron and Steel federation and the continental steel cartel means in effect that certain prescribed quantities of iron and steel products of the classes in question can be imported on payment of import duty from each exporting country at the rate of 20 per cent. In order to insure that the maximum quantity is not exceeded in any year, consignments of such goods, in order to qualify for admission at the reduced rate of duty, must be accompanied by a quota certificate and a certificate of origin.

The immediate problem of producers is meeting specifications from consumers who already have heavy contracts placed for material. It is estimated in the heavy steel trade, for example, that in some cases structural interests have bought as far ahead as nine months. For a long time there has been delay in securing delivery, and there seems no prospect of overcoming this position unless more plant is brought into commission.

Similarly in the pig iron market, forward bookings go as far ahead as the end of June, and in some districts there is a definite reluctance on the part of furnace owners to book further orders pending some clearer indication of the trend of prices in the near future.

Production costs are rising, and although there has been some increase in selling prices in all branches, many industrialists consider that they should be getting a better return for capital expended, particularly bearing in mind the lean years of the industry between 1929 and 1933.

French Production Summary for 1936

(Metric tons 000 omitted)

	PRODUCTION*					IMPORTS@		EXPORTS@		
Mo. ave.	Iron ore	Coke†	Pig iron and ferro-alloys	No.‡ furnaces in blast	Steel ingots and castings	Coke	Pig iron and ferro-alloys	Steel§	Pig iron and ferro-alloys	Steel§
1913	3,588	366	756	195	581	256	4.2	10	9	51
1933	2,520	320	527	91	544	187	8.1	17	15	208
1934	2,668	342	514	86	514	183	5.1	11	14	253
1935	2,671	324	482	81	523	176	4.9	10	14	184
1936										
Jan.	2,820	349	509	81	561	171	3.0	12	25	124
Feb.	2,742	330	500	82	538	175	7.0	7	13	144
March	2,891	352	543	83	575	213	6.0	7	16	162
April	2,822	336	524	83	571	235	6.0	6	8	153
May	2,849	347	554	84	609	213	6.0	5	11	173
June	2,716	289	470	85	503	250	8.0	6	7	108
July	2,726	350	519	84	542	197	6.0	5	6	145
Aug.	2,367	307	465	82	460	210	6.0	9	6	134
Sept.	2,607	314	492	80	545	216	5.0	6	7	142
Oct.	2,964	328	551	82	623	197	6.0	11	12	170
Mo. ave.	2,750	330	513	82	553	208	5.9	7.4	11	146

*Production for 1913 is for France in her present boundaries.
†Coke production at the coal mines. In addition, the iron and steel works produce about 2,500,000 tons annually.
‡On last day of year, or month.
§Includes ingots, semifinished steel, all rolled products, forgings and scrap.
@Import and export figures are inclusive of the Saar district for 1933 and 1934.

French Producers Numbed By Political Unrest

BY LEON JAUDOIN
French Correspondent

CONDITIONS in France at the beginning of 1936 as regards steel prices were markedly opposite to the general tendency in the rest of the world. Prices in France were then high, but in the rest of Europe, as well as in the United States, there was a definite tendency toward higher prices, which should have reduced the margin existing between French and world prices.

Unfortunately, efforts made by the Laval ministry to reduce the general price index were unsuccessful and, as a result of continued high prices, French production was handicapped. Nevertheless, at the beginning of 1936 there were signs of the possibility of a revival of industrial activities, particularly as most consumers' stocks were seriously depleted, and had it been possible to instill among consumers greater confidence in the future, both inside and outside the country, there should have been a marked improvement in trade conditions.

The first setback occurred in March, following the "putsch" on the Rhine zone by Germany. The effect of this move on business passed fairly quickly, and the French government increased its program of defense. A little later, in April, there was again a tendency toward trade improvement, but the results of the legislative elections in May, with the victory of the Popular Front, mainly composed of socialists and communists, brought about in business circles almost a panic, accompanied by the flight of French capital to foreign countries. After

the elections the existing moderate government remained temporarily in power, but was incapable of any initiative, and even before the new Blum government was installed, a number of now familiar "sit-down" strikes broke out in various plants of the country.

When Leon Blum took over the reins of government, this movement expanded, and at one time it was feared that a general strike would spread over the entire country, but gradually law and order were restored to some extent. Although there appears to be reason to believe that many of the strikes had a revolutionary origin, it is generally recognized that a considerable portion of the demands made by the workers were fair and reasonable, including adjustments in wages and holidays with pay.

In the course of negotiations between the government, employers and workers during June, representatives of the employers accepted most of the demands put forward by the Popular Front, and, with hardly any transition, legislation was passed which gave all workers an increase of wages, two weeks' holiday with pay and, a little later, a 40-hour week.

As was to be expected, these changes, brought about suddenly in the economic structure of the French industry, caused serious disturbances in the planning of business and operation of plants, and the hopes of the government that such changes could be effected without increasing the cost of living were dashed. By the end of September, notwithstanding the statement previously made by responsible members of the government, the franc was devalued by about 40 per cent.

After the new franc was established, prices soon began to increase again, and from October onward consumers began to place orders in large volume in fear of still further increases in the prices of steel products. The buying movement was intensified later in the year in anticipation of the effects of the application of the new 40-hour week regulations. It is felt, however, that this abnormal demand is of an artificial nature.

Unemployment Still a Pressing Problem

A program of public works approved by the government earlier in the year was delayed in operation, and, as a result, a considerable amount of unemployment existed in France for the greater part of the year. At the end of October there were over 400,000 unemployed, or 28,000 more than in October, 1935. In addition, a large number of men are working only part time in the various industries. The balance of trade for the first nine months of the year was unfavorable.

During the first months of 1936, the production of steel was at a higher level than during the corresponding months of 1935, and in view of the increased demand in the later months of the past year, the total production of 1936 is somewhat higher than in the preceding year, notwithstanding the fact that in August output was reduced owing to serious strikes in iron and steel works. During the first nine months of 1936, 4,030,000 metric tons of steel ingots were consumed by rolling mills for all rolled products controlled by the various syndicates; of this total, 3,185,000 tons were for the domestic market and 845,000 tons, or 21 per cent, for export.

Various adjustments were made to wages in the iron and steel trades, beginning with an increase of about 10 per cent in June, followed by further increases brought about by the application of the collective contract arrived at as between representatives of French industry and the Blum government. This was one of the items of the social program of the Popular Front.

Negotiations concerning renewal of the various selling syndicates that branch from the Comptoir Siderurgique de France had commenced at the end of 1935 and eventually the whole organization was renewed for a period of five years. There were, however, two important matters to settle, one being the relations between the rerollers and the steelworks, and the other the organization of the retail market. Agreement was reached with the rerollers, who are now members of the merchant bar syndicate: A quota of production has been fixed for them, and their output is taken over by the syndicate at a price to be agreed upon.

Syndicates Hindered by "Captive" Elements

The merchant trade for bars, shapes, etc., has also been regulated, but apparently the basis of organization has not yet been accepted unanimously by all the merchants and jobbers. However, it is essential for the good working of the syndicates generally that a settlement be achieved. The main difficulty is in connection with "captive" warehouses, belonging to the steel-producing firms, and through which producers compete with merchants. It is probable that the necessary concessions will be made. The proposed organization covers a selling quota for merchants and jobbers, which would be fixed for the various economic regions of the country and merchants would be compelled to sell their products in their own district, prices being fixed by mutual agreement. Tonnages sold by merchants but shipped direct from the works would also be covered by special regulations.

The union of steel wire drawers, which has for its object the compilation of production statistics and to ascertain that fixed prices are followed, continued to function normally. As the year drew to a close, difficulties were foreseen in regard to renewal of that organization owing to operation of the new wire works at Marneval, a subsidiary of the Cie. des Forges et Acieries de la Marne. Owing to the large capacity of production of this mill, the quota demanded by the concern is considerable and is disturbing the balance as regards other producers.

The pig iron syndicate for basic pig iron was reformed at the beginning of 1936 and functioned normally, and this was also the case for the hematite pig iron entente and for the ferromanganese syndicate. Generally speaking, it can be said that the whole of the iron and steel industry is now well organized, with the exception of the light-gage sheet manufacturers: in view of the considerable demand now prevailing for sheets, it is not expected that this group will organize for some time to come. In France, tin plates are also uncontrolled.

During 1936 the tendency of iron and steel prices

was ascending, the result of the various events which occurred in the country, particularly as regards application of the new social legislation. From July, beams were quoted at 620 francs per metric ton, merchant bars at 630 francs, hoops and bands at 735 francs and plates at 790 francs, these being the basis prices for products routed from Thionville.

Following devaluation of the franc, a further increase of prices occurred and hematite pig iron was then quoted at 460 francs, billets at 480 francs, beams at 650 francs, merchant bars at 665 francs, hoops and bands at 770 francs, plates at 830 francs and wire rod at 830 francs. Even at the end of the year the quoted prices were considered provisional, owing to the uncertainty due to the effects of recent legislation.

Since devaluation of the franc the market has been active and works have their order books well filled. Apart from causes already stated, it is felt that considerable of this activity has been due to speculation brought about by financial instability, as a number of industrialists fear further devaluation and further price increases, with the result that many firms were anxious to cover themselves as a precaution. It is also feared that, owing to the higher cost of living, a further demand for wage increases will occur. Apart from this abnormal demand, the main support of the market is the prospective program of public works and the contracts resulting from the armament program.

For France, the end of the year was marked by considerable political difficulties and by a state of anxiety in the minds of most industrialists. It is impossible to predict the outcome in the near future, as this depends to a large extent upon political factors, the main characteristic of which, at present, is their uncertainty.

Central Europe in Advance; Russia Floods Iron Market

BY DR. JAN TILLE
Special Correspondent

INDUSTRY in Central Europe again improved its position in 1936 in comparison with the previous year, although the development was not uniform in the various countries concerned.

Dominating the picture, of course, was Soviet Russia where production of raw steel since 1932 has been increasing by leaps and bounds. From about 6,000,000 metric tons in 1932, the output was doubled in 1935, and in 1936, with almost 16,000,000 tons, the 1932 output nearly trebled.

Importation of rolled material into Russia is steadily falling off, and occasionally the Soviets have even appeared as exporters in various markets: For instance, they have exported plates to the Netherlands and rails to Iran.

Worthy of special mention is the manufacture and also the exportation of pig iron of Soviet origin. Russia's share in the world production of pig iron has increased, according to Soviet figures, from 8.9 per cent in 1931 to 16.8 per cent in 1934 and 17.1 per cent in 1935. The proportion for 1936 will probably be less, owing to the relatively large increase of output of the rest of the world.

Shift in Russia's pig iron export trade is striking: In 1931, Russia imported 68,000 metric tons, whereas in 1932 the country began to export, until the figure for the first half of 1936 attained 340,000 metric tons, which means that Russia is now the largest exporter of pig iron in the world, being followed by India with 316,000 tons, Germany with 126,000 tons, Holland with 106,000 tons, France with 73,000 tons, Great Britain, Belgium, Sweden, Austria—the figures being for the first half of 1936.

Today, Russia's share in world exports of pig iron has increased from 8.9 per cent in 1934 to 31.7 per cent in the first half of 1936.

It is probable that the Soviets will soon realize their program by which they intend to attain a production of 25,000,000 metric tons of raw steel per year. It is now quite certain that Soviet Russia is no longer a market for the sale of foreign rolled material — it is only likely to import inconsiderable quantities of special material. On the other hand, it is certain that Russia will appear more and more in the world market as an exporter.

In Czechoslavakia, figures show the turnover of rolled steel was about 50 per cent higher than in 1935. In the first nine months of 1936 the production of raw steel was 1,102,500 metric tons, which corresponds to an annual production of approximately 1,500,000 tons, an increase of 40 per cent. Works were occupied to about 75 per cent of capacity. Exports showed a slight increase. Indirect exports, that is, material supplied to domestic manufacturers for fabricating with a view to exporting the finished product, were about level with those of 1935; on such material as is supplied to the domestic fabricator, an export rebate is granted.

The special credit arrangement with Soviet Russia, whereby Czechoslovak banks and large manufacturers granted considerable credit to fabricating firms, was completely exhausted and has not yet been renewed. Exports to Soviet Russia in the second half of the year showed a slight decline.

Relations between Czechoslovakia and the international steel cartel underwent no change in 1936. The Czechoslovak works are members of the plate

Russia's Place in World Trade

SOVIET IMPORTS IN FIRST NINE MONTHS OF 1936

Metric Tons

From:	Rolled Steel	Sheets	Tubes
Germany	7,796	18,348	561
Belgium and Luxemburg	6,164	32,500	2,036
France	11,037	10,155	8,282
Czecho-Slovakia	12,871	5,902	11,111
Poland	2,006	17,220	....
Sweden	2,416	....	836
United States	9,586	28,304	1,143
Japan	2,086	398	3,527

SOVIET EXPORTS IN FIRST NINE MONTHS OF 1936

Metric Tons

Pig iron	613,750 (225,092 in the same period of 1935)
Rolled Steel	20,450 (12,934 in the same period of 1935)

MORENINOV and Zhukov, Stakhanovite fitters, have become so handy with their wrenches they fulfill 200 per cent of their norm of work on the main conveyor of the Chelyabinsk tractor plant in Russia, and thereby earn correspondingly high wages. The plant produced 29,000 tractors last year, it is reported
Sovfoto

and medium sheets syndicates, but repeated negotiations with the syndicates dealing with the groups of semifinished steel, structural steel, hoops and bands and fine sheets have not yet given definite results. The Czechoslovak participation in the International Rail Manufacturers' association remained unchanged.

In October, 1936, the Czechoslovak crown was devalued by 16 per cent, without any appreciable dislocation in the early stages. The devaluation had practically no influence on the manufacturing estimates of the steel industry, as the amount of money needed for imported material (iron ore, etc.) was nearly the same as the value of the goods normally exported. Steel selling prices remained unchanged throughout the year, except for wire and nails, both of which products were increased in price before, and without any reference to, the devaluation of currency.

Export difficulties resulting from clearing arrangements continued, these difficulties being mainly due to the transfer of payments from certain countries. Prospects for the Czechoslovak steel industry in the immediate future are quite favorable, as the development of building activity and state expenditure is satisfactory.

The situation of the steel industry in Austria improved, as is apparent from production statistics. Production of raw steel attained 210,000 metric tons in the first half of 1936, compared with 182,000 tons in the corresponding period of the preceding year. The output of iron ore in the well-known mines of Erzberg in Styria increased. Steel exports increased to 157,000 metric tons in the first eight months of 1936, against 105,000 tons in the first eight months of 1935.

Hungary also augmented its steel production, 275,000 metric tons having been produced in the first half of 1936, whereas only 225,000 tons were produced in the corresponding period of 1935. There was no change in the attitude of Austria and Hungary to the international steel cartel, both countries preferring to remain outside this international organization.

In Poland the improvement in steel production was not so great, relatively, as in the neighboring countries, as is shown by the fact that steel production in the first half of 1936 was 517,000 metric tons, compared with 466,000 tons in the same period of 1935, an increase of about 11 per cent. The output of pig iron rose from 183,000 tons in the first half of 1935 to 260,000 tons in the first half of 1936. The economic situation of the country tended to improve toward the end of the year.

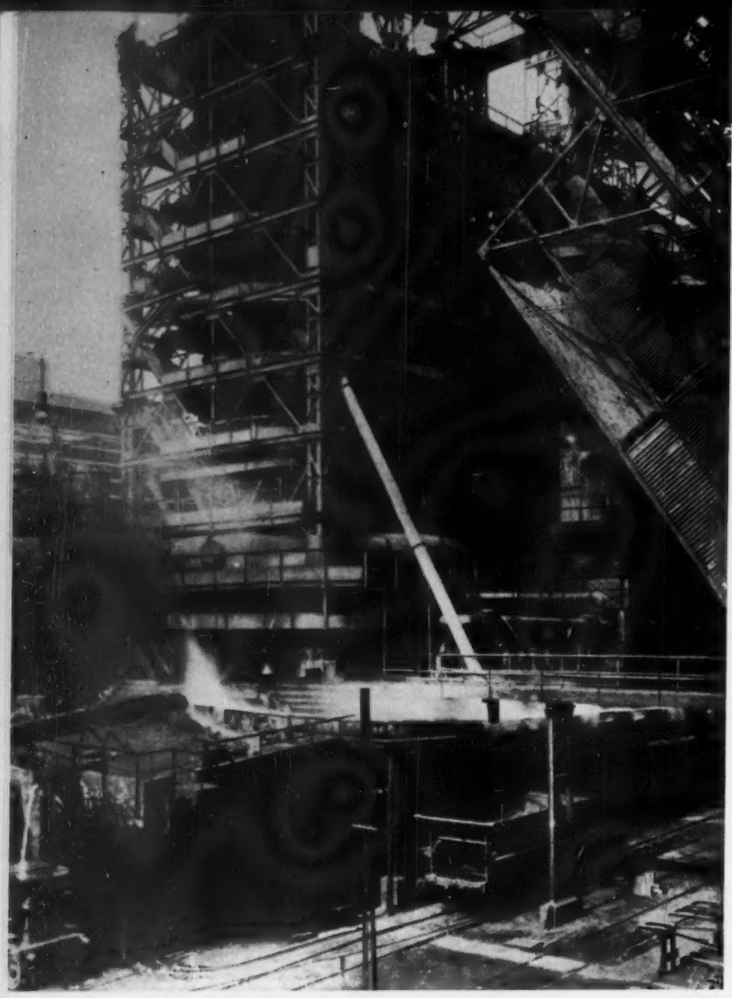
Nationalist Policies Sweep German Plants to New Peak

EUROPEAN STAFF SPECIAL

RECORD production figures were returned in the iron and steel industry of Germany during the year 1936. In particular, large contracts placed for construction of national motor roads, increasing use of motor vehicles, erection of new buildings in the chemical industry for treatment of coal, and national defense stimulated demand for iron and steel to such an extent that the capacity of German iron and steel works was utilized practically to the full. Industries engaged in further processes such as foundry work, erection of steel structures, manufacture of vehicles, shipbuilding, production of machinery, boilers and fittings, came on the market to an increasing extent as consumers of iron and steel.

During the first half of 1935, 120,535 motor cars were made in Germany; during the first half of 1936 the corresponding figure was 150,535, which means an increase in production of approximately 25 per cent. Activity of the German shipyards showed an even greater increase. Whereas at the end of 1935 orders placed with German shipyards for merchant vessels amounted to approximately 250,000 gross register tons, the tonnage ordered by the end of 1936 amounted to 650,000 gross register tons, an increase of 160 per cent.

These instances make it possible to appreciate how greatly German consumption of iron and steel has increased. Since the economic depression in 1932, consumption of steel in Germany, expressed in kilograms per capita, has developed as follows: 200 kilograms in 1929; 59 kilograms in 1932; 104 kilograms in 1933;



BRISTLING industrial activity in Germany has kept a steady stream of iron pouring from this blast furnace of the Iron & Steel Works of Hoesch, at Dortmund, during the past year

177 kilograms in 1934; 211 kilograms in 1935, and an estimated 240 kilograms in 1936. These figures show that the high consumption of steel, high even for German conditions, during the boom year of 1929 was exceeded as early as in 1935, in which connection the return of the Saar to Germany at the beginning of 1935 should, however, be borne in mind. The consumption of steel in 1936, attaining approximately 240 kilograms per capita, has probably exceeded even the consumption for 1913, in which year Germany still possessed her pre-war frontier.

The production of the German heavy industry during the period January to October, 1936, was as follows (1935 figures in parentheses): pig iron 12,788,-084 tons (10,451,574 tons); steel ingots and castings 16,174,887 tons (13,494,036 tons); rolled products 11,224,681 tons (9,406,036 tons).

Heavy increase in German iron and steel output resulted in a greater demand for ore supplies on the part of German iron and steel works, so that there also occurred an increase in German ore production. Ore output in 1932 was 1,340,000 metric tons; it increased to 4,343,000 tons in 1934, to 5,302,000 tons in 1935, and approximately 6,500,000 tons in 1936.

The importation of iron ore into Germany also augmented as a result of the considerable increase in the requirements of German industry. From 3,558,000 metric tons in 1932, imports of iron and manganese ore increased to 14,455,000 tons in 1935, and to an estimated tonnage of 19,000,000 tons in 1936, the Saar being included as from Feb. 18, 1935. The 1936 import tonnage means an increase of 434 per cent over that of 1932. In this connection, however, it should be borne in mind that in 1932, owing to the depression then prevailing in German industry and also to the long-term contracts with Swedish ore producers, considerable supplies of ore existed in Germany, and that the ore requirements of the iron and steel industry in the Saar were not then included in German imports.

Import Manganese Ore from Brazil, South Africa

During 1936, increased imports of iron ore came from Sweden, France, Luxemburg, and Algeria, while supplies of Spanish ore dropped, because of the civil war. The importation of manganese ore into Germany was smaller in 1936 than in the preceding year because Russian supplies ceased almost entirely in the latter part of the year. To make up for the absence of Russian ore to a certain extent, contracts for the supply of manganese ore were placed with the Union of South Africa. Moreover, in addition to Indian manganese ore, a fairly large shipment of Brazilian manganese ore was imported.

Imports of scrap into Germany have likewise increased considerably since 1932, as shown by the following figures: From 99,000 tons in 1932 to 501,000 tons in 1934, falling to 277,000 tons in 1935, and approximately 350,000 tons in 1936. If sufficient foreign currency had been available, larger quantities of scrap would have been imported into Germany during the last two years.

On the whole it may be said that production in the German heavy industry is proceeding at full capacity. No extended comments are needed to show that the high increase in the production of the German heavy industry is chiefly due to the increased requirements of the home market. The demand for iron and steel is at present so great in Germany that periods of several months are required for the delivery of many products. In order to check to some extent the partly excessive demands made by consumers, the Iron and Steel Control Board issued an order at the end of September according to which warehouse merchants and jobbers were allowed to keep stocks equal only to the average held in 1935; under a further order, made

German Production Summary for 1936

(Metric tons 000 omitted)

	PRODUCTION*				IMPORTS‡		EXPORTS‡		
Mo. ave.	Coke	Pig iron and ferro-alloys	No.† furnaces in blast	Steel ingots and castings	Pig iron and ferro-alloys	Steel§	Coke	Pig iron and ferro-alloys	Steel§
1913.....	2,639	1,024	225	1,166	11.0	41	534	71	470
1933.....	1,763	439	48	436	6.3	101	448	9.6	169
1934.....	2,040	728	73	993	7.7	151	514	13.8	200
1935.....	2,463	1,070	108	1,370	8.2	68	550	19.1	249
1936.....									
Jan.....	2,858	1,279	110	1,584	27.7	46	581	24.3	299
Feb.....	2,730	1,173	108	1,489	19.2	54	508	18.1	298
March....	2,919	1,251	108	1,558	5.1	60	528	21.4	279
April.....	2,755	1,211	107	1,467	11.9	65	548	26.7	246
May.....	2,928	1,228	107	1,568	8.9	62	560	21.4	273
June.....	2,905	1,242	106	1,631	6.2	71	572	25.0	276
July.....	3,035	1,312	107	1,721	5.4	64	597	25.3	310
Aug.....	3,000	1,362	111	1,725	5.1	59	619	19.2	285
Sept.....	2,961	1,350	116	1,721	6.5	59	653	25.6	277
Oct.....	.....	1,379	117	1,705	....	...	...	....	...
Mo. ave...	.....	1,279	...	1,617	....	...	...	....	...

*Figures for 1913 are for Germany in her present boundaries; figures for 1933 and 1934 do not include the Saar.
†On last day of year, or month.
‡Figures for 1913 are for pre-war boundaries and include Luxemburg. The returns for 1933 and 1934 do not comprise the Saar.
§Includes iron castings and scrap.

also at the end of September, iron and steel works were bound to observe certain restrictions as to their stocks of ores, pig iron and scrap.

As regards German foreign trade in iron and steel products, an appreciable increase in exports was recorded in the first nine months of 1936 in comparison with the corresponding periods in previous years, while imports showed a reduction. In the period January to September, 1936, total exports of iron and steel, including scrap, were 2,750,000 metric tons, compared with 2,311,300 tons in the corresponding period of 1935. Corresponding figures for imports were 626,000 tons and 810,200 tons respectively. In the first ten months of 1936, therefore, the excess of exports over imports in the German iron and steel industry was considerably higher than during the corresponding period of 1935 and also of previous years.

With regard to values, the returns for German foreign trade in iron and steel products show that, in comparison with previous years, the German industry achieved the highest excess of exports over imports recorded over a period of five years. In comparison with the corresponding period of 1935, the excess of exports over imports, in value, showed an increase of 25.6 per cent only, during the first three quarters of 1936, while tonnage increased by 30 per cent.

From this the conclusion must be drawn that, more particularly as regards the products of the semifinishing and finishing industries, there has been a relative falling off in the proceeds from exports. Among the products of industry which are exported, if tubes are left out of consideration, as the international tube cartel has been dissolved, the most important rolled products are subject to international control. As, however, the international associations partly increased their prices in 1936, there can have been a falling off only in the proceeds obtained from the exportation of the internationally uncontrolled products of the industry.

Four-Year Plan Enlarges Demand

Generally it can be said that the German heavy industry has lately experienced a revival which would have hardly been considered possible a few years ago. The German iron and steel industry is now employed at almost full capacity. Germany's requirements of steel are indeed so great that certain measures have had to be taken so that, apart from exports, preferential treatment might be given to those home requirements which are most important from the economic and military points of view.

Home requirements to be satisfied in the first place include, of course, the demands resulting from the new four-year plan. Moreover, the new beneficiation plants for German ores also call for certain quantities of steel, which have to be supplied immediately. It must also be stated that doubling of the term of service in the German army, decided upon in 1936, and the provision of the buildings and equipments thereby necessitated, will involve more.

As this great revival in Germany's industries has already caused an appreciable shortage of skilled labor, and as the execution of the four-year plan will make further considerable demands upon the German labor market, regulations for insuring the supply of suitable labor were issued in November, 1936.

One set of regulations provides for the long-term training of skilled workers in the iron and steel industry and the building trade. Two other orders are to prevent the unconsidered migration of skilled workers within Germany. In order that the "raw material distribution," "provision of labor" and "calculation of prices" groups of the organization set up for the execution of the four-year plan under General Goering may be kept constantly informed of all existing building schemes, specified private and public building schemes have to be reported to the competent offices of works in accordance with the order, as from Dec. 1, 1936. At the same time information is to be supplied regarding the number of workers required and the quantities and prices of the raw materials to be used.

On the one hand, its raw material basis will be enlarged in some measure by the furtherance of the home iron ore mining industry, which naturally will necessitate the enlargement of existing plants or the erection of new ones. On the other hand, the German steel-producing and finishing industry will participate to a considerable extent in the construction and extension of the new cellular wool factories, fuel plants and rubber works, by supplying their large requirements of iron and steel, machinery, equipment, storage containers, etc.

Last, but not least, the German iron and steel industry, which, through the international steel associations, has been assured of a certain share in the world markets' requirements of rolling mill products, with the exception of tubes, will, for national and political reasons, devote its special attention to export trade interests.

Censorship Suspends Italian Review

RIGID censorship of statistical information on Italian industry, imposed under the dictatorship of Premier Mussolini, has made any intelligent survey of progress there for the past year impossible. Since sanctions were applied against Italy in connection with the Abyssinian invasion, Il Duce has clamped down the lid on all production figures. Hence the customary review of the Italian situation is lacking this year.

Not a major steel producing or using nation, Italy is estimated by STEEL'S *European manager to have turned out some* 2,250,000 *tons of steel ingots and castings in* 1936, *or* 75,000 *tons over the* 1935 *total. Estimated increase in pig iron production is likewise* 75,000 *tons, bringing the* 1936 *total to about* 750,000 *tons.*

Belgo-Luxemburg Obstacles Gradually in Eclipse

EUROPEAN STAFF SPECIAL

AS 1936 dawned, Belgian and Luxemburg steelworks already had a good tonnage of orders on their books for all but a few products in respect of which special efforts were made with a view to obtaining orders. Generally

speaking, the year had started well. From the point of view of export trade, business in Belgium and Luxemburg was somewhat hampered by difficulties in regard to the clearing arrangements concerning payments with certain importing countries.

Owing to increases of wages and a rise in the cost of raw materials, the prices of principal iron and steel products for the home market were increased by about 50 francs a metric ton in the first part of the year. Another reason for higher domestic prices was the margin then existing between the relatively low domestic prices and export prices; the resulting tendency to concentrate on export markets created a disturbance in the relations with the international steel cartel, and, in fact, it was intended at the time to institute a regime of export licenses to prevent Belgian producers from exceeding their quota of export sales.

From the middle of March the domestic prices of a number of representative products were as follows: Billets, 555 Belgian francs per metric ton; beams, 650 francs; merchant bars, 650 francs; wire rod, 850 francs, all these prices being delivered at works in Belgium.

During the first part of the year activity of works was such that production was about 75 per cent of capacity. In June, labor troubles occurred which culminated in more or less general strikes that broke out at the beginning of July. These strikes caused deliveries to be delayed, especially to Great Britain, for which market the June quota could not be met. Strikes at the ports also made shipments of goods difficult, with the result that buyers endeavored to enforce penalties to compensate for the delays.

Strikes also caused delays in deliveries to the Belgian works of raw materials, such as iron ore and fluxes. In a relatively short time, however, the government managed to stem the strikes, and at the same time a general increase of wages was decided upon, but this step caused production costs to rise, in some cases by as much as 30 per cent. Eventually, domestic selling prices were again raised by about 50 francs per metric ton for a number of products as from the beginning of August.

Generally speaking, the tendencies of the Belgian market remained favorable, and the works were sufficiently well occupied to justify deliveries being extended from six to eight weeks. However, the steel industry experienced some difficulty in finding skilled labor, the troubled circumstances of the time offering little inducement to young workers to attend technical schools and improve their professional education.

One feature of the devaluation of a number of European currencies following the devaluation of the French franc was the alleviation of the position of a number of important Belgian and Luxemburg steelworks which had contracted foreign loans in appreciated currencies. Thanks to this relief and to the increased activity of the industry during recent months, there are hopes that in the coming financial year a number of these works will show profitable results. In the domestic market a source of activities is found in a large program of public works, in the program of defense measures along the frontier and also in connection with the construction of the Albert canal from Liege to Antwerp. Important contracts are also anticipated in respect of the work to be effected on the railroads in the Belgian Congo.

Export Trade Holds on Even Keel

With regard to export markets, during 1936 it was found that Japanese competition was less active than in recent years, probably due to increasing Japanese activities at home relative to armament work. Sales of Russian pig iron did not have quite the detrimental effect that was expected. Renewed activities on the part of Holland were also noticeable, resulting in heavier purchases from that country, and, thanks to certain adjustments in prices, business in Scandinavian countries also developed. A satisfactory amount of business was done with North America, but demand from Brazil and the Argentine Republic showed little increase.

From the point of view of the international regulation of markets, the international steel cartel operated satisfactorily and extended its action to the British trade. The first steps toward the organization of an international sheet syndicate were also taken, although this syndicate was not yet definitely constituted at the end of the year.

Export prices at the end of 1936 showed little variation in comparison with those prevailing at the beginning. These give only an idea of actual conditions, since c.i.f. prices are quoted for most individual markets. These c.i.f. prices are based on the following prices, f.o.b. Antwerp in gold pounds: Billets, £2 7s; beams, £3 5s; 1-millimeter sheets, £8 15s; 2-millimeter sheets, £7; merchant bars, £3 5s to £3 10s; hoops, £4 to £4 2s 6d. The c.i.f. prices for certain specific markets experienced some fluctuations during the year, depending partly on freight rates. The tendency was usually toward higher prices.

Demand developing from export markets and the satisfactory maintenance of prices through the international cartels and syndicates lead to the belief that the outlook for the Belgian metallurgical industry for 1937 is promising, particularly in view of the agreements which now have been satisfactorily concluded with the workers' syndicates.

Belgian-Luxemburg Production in 1936

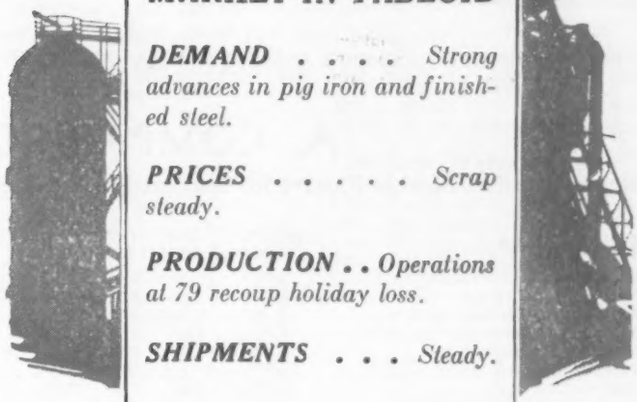
(Metric tons 000 omitted)

	PRODUCTION				IMPORTS		EXPORTS	
	Belgium		Luxemburg		Belgium and Luxemburg			
Mo. ave.	Coke	Pig iron and ferro-alloys	Steel ingots and castings	Pig iron and ferro-alloys	Steel ingots and castings	Pig iron	Steel*	Pig iron	Steel*
1913.....	294	207	206	212	98	48†	26†	1.4†	130†
1933.....	366	226	228	157	154	18	16	3.1	283
1934.....	353	246	245	163	161	18	19	3.6	304
1935.....	390	255	252	156	156	17	13	3.5	298
1936.....									
Jan.....	425	273	280	156	154	23	17	5.3	317
Feb.....	405	268	271	151	151	20	15	5.1	273
March...	427	282	279	151	149	23	18	4.1	334
April....	423	271	269	153	153	21	20	7.9	267
May.....	438	272	250	161	161	19	21	8.5	291
June.....	347	174	152	153	152	15	13	1.5	189
July.....	423	252	250	182	162	26	18	5.0	366
Aug.....	435	286	272	170	164	23	21	7.3	328
Sept.....	422	268	275	184	185	32	18	3.5	310
Oct.....	436	286	298	186	188	..	..	...	...
Mo. ave..	418	263	260	165	162	22	18	5.4	297

*Includes iron castings and scrap.
†Belgium only.

Production Snaps Back to Pre-Holiday Rate

Heavy Backlogs in All Lines; Motor Cars Again Decline



MARKET IN TABLOID

DEMAND . . . . *Strong advances in pig iron and finished steel.*

PRICES . . . . . *Scrap steady.*

PRODUCTION . . *Operations at 79 recoup holiday loss.*

SHIPMENTS . . . *Steady.*

STEELWORKS operations last week snapped back to 79 per cent, regaining practically all the loss of Christmas week. Because of pressure for delivery the industry operated through New Year's day.

Probably no December in recent years, certainly not since World War days, has seen such pressure on mills and such consistently high operating rates as in the closing days of 1936.

Last week's operating rate showed the following sharp recoveries: Pittsburgh, 10 points to 77 per cent; Chicago, 13 points to 77; eastern Pennsylvania, 4½ to 52; Youngstown, 10 to 78; Wheeling, 4 to 92; Cleveland, 9 to 77; Buffalo, 37 to 84; Detroit, 8 to 100. Birmingham and St. Louis were unchanged, and Cincinnati lost 4 points to 92 per cent.

With December estimated, steel ingot production in 1936 totaled about 47,876,000 gross tons, compared with 33,417,985 tons in 1935. This is the largest output since 1929, with 54,312,279 tons.

Pig iron also made a heavy gain, total production with December estimated being 31,078,000 gross tons, compared with 21,040,483 tons in 1935. However, pig iron in 1936 fell slightly below the total of 31,441,488 tons in 1930.

The industry is now firmly on the higher price basis announced several weeks ago for first quarter delivery. Heavy backlogs in practically all products assure steady production near the current rate for at least several weeks. Needs of consumers appear to be sufficient to absorb tonnage as fast as it is delivered, as stocks have not been built up.

Mill books are better balanced than for several years, buying of heavy steel products in the past few months having been greater than for some time. Rail tonnages on books are unusually large, giving occupation to mills that had been less actively employed than those producing light products.

The only unfavorable factor is the labor situation in the automotive industry. Automobile output last week dropped to 71,800 from 79,019 in the week preceding. In the third week of December 121,038 cars were built.

Shape awards increased about 5000 tons over the preceding week to 33,736 tons. This compares with a weekly average of 21,765 tons for 1936 and 17,081 tons for 1935. Further structural buying is indicated by heavy inquiry, the Chicago district alone having about 35,000 tons pending. The past week 2350 tons were awarded for a New York subway job and 2260 tons for a government hangar.

Advance of 50 cents per ton on pig iron, effective Jan. 1, first announced a week ago by Pittsburgh makers, has become general, putting the pig iron level $1.50 above that prevailing up to the latter part of November. However, as buying has been unusually heavy and some producers have sold beyond first quarter production the new price will not be generally applicable until April. Abolition of the freight surcharge Jan. 1 will partially offset this latest advance, especially on longer hauls. Japan is said to be in the market for 100,000 tons, principally foundry grades, following its recent purchase of about 40,000 tons.

River transportation interests contributed something like 7500 tons of plates in purchase of 44 steel barges for coal, oil and sand handling. Rail buying has been practically completed, but more car purchases are in early prospect.

Of interest to steel rail producers is the announcement of a sale by Japan of 5187 tons of rails to Bahia, Brazil. This is the first time Japan has sold rails in South America, which has been taking most of its railway needs from the United States.

The scrap market is dominated by an expected inquiry from a Catasauqua, Pa., melter for about 50,000 tons of No. 1 machinery cast to be used in making cast iron segments for lining the Midtown tunnel in New York. STEEL's composite for scrap is unchanged this week at $17.58 after five successive weeks of increases from $16.

Giving effect to price increases of Jan. 1, STEEL's finished steel composite is $55.80, compared with $53.90 through December. The iron and steel composite is $36.48, compared with $35.33 the preceding week.

COMPOSITE MARKET AVERAGES

	Jan. 2	Dec. 26	Dec. 19	One Month Ago Dec., 1936	Three Months Ago Oct., 1936	One Year Ago Jan., 1936	Five Years Ago Jan., 1932
Iron and Steel	$36.48	$35.33	$35.18	$35.15	$34.67	$33.34	$29.65
Finished Steel	55.80	53.90	53.90	53.90	53.90	53.70	47.28
Steelworks Scrap..	17.58	17.58	17.21	16.92	16.44	13.15	8.03

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Jan. 2, 1937	Dec. 1936	Oct. 1936	Jan. 1936
Steel bars, Pittsburgh	2.15c	2.05c	2.05c	1.85c
Steel bars, Chicago	2.25	2.10	2.10	1.90
Steel bars, Philadelphia	2.49c	2.36	2.36	2.16
Iron bars, Terre Haute, Ind.	1.95	1.95	1.95	1.75
Shapes, Pittsburgh	2.05	1.90	1.90	1.80
Shapes, Philadelphia	2.25½	2.11½	2.11½	2.01½
Shapes, Chicago	2.10	1.95	1.95	1.85
Tank plates, Pittsburgh	2.05	1.90	1.90	1.80
Tank plates, Philadelphia	2.23½	2.09	2.09	1.99
Tank plates, Chicago	2.10	1.95	1.95	1.85
Sheets, No. 10, hot rolled, Pitts.	2.15	2.10	1.95	1.85
Sheets, No. 24, hot ann., Pitts.	2.80	2.75	2.60	2.40
Sheets, No. 24, galv., Pitts.	3.40	3.35	3.20	3.10
Sheets, No. 10, hot rolled, Gary	2.25	2.25	2.05	1.95
Sheets, No. 24, hot anneal., Gary	2.90	2.90	2.70	2.50
Sheets, No. 24, galvan., Gary	3.50	3.50	3.30	3.20
Plain wire, Pittsburgh	2.60	2.60	2.50	2.30
Tin plate, per base box, Pitts.	5.25	5.25	5.25	5.25
Wire nails, Pittsburgh	2.25	2.20	2.05	2.40

Semifinished Material

Sheet bars, open-hearth, Youngs.	$34.00	$32.00	$32.00	$30.00
Sheet bars, open-hearth, Pitts.	34.00	32.00	32.00	30.00
Billets, open-hearth, Pittsburgh	34.00	32.00	32.00	29.00
Wire rods, No. 5 to 19/32-inch, Pitts.	43.00	40.00	40.00	40.00

Pig Iron

	Jan. 2, 1937	Dec. 1936	Oct. 1936	Jan. 1936
Bessemer, del. Pittsburgh	$22.31	21.8132	20.8132	20.81
Basic, Valley	20.50	20.00	19.00	19.00
Basic, eastern del. East Pa.	22.26	21.8132	20.8132	20.81
No. 2 fdy., del. Pittsburgh	22.21	21.3132	20.3132	20.31
No. 2 fdy., Chicago	21.00	20.50	19.50	19.50
Southern No. 2, Birmingham	17.38	16.88	15.50	15.50
Southern No. 2, del. Cincinnati	20.94	20.44	19.44	20.20
No. 2X eastern, del. Phila.	23.135	22.6882	21.6882	21.68
Malleable, Valley	21.00	20.50	19.50	19.50
Malleable, Chicago	21.00	20.50	19.50	19.50
Lake Sup., charcoal, del. Chicago	26.54	26.2528	25.7528	25.25
Gray forge, del. Pittsburgh	21.17	20.6741	19.6741	19.67
Ferromanganese, del. Pittsburgh	84.79	82.65	80.13	90.13

Scrap

Heavy melting steel, Pittsburgh	$18.25	$18.55	$18.15	$14.50
Heavy melt. steel, No. 2, east. Pa.	14.00	14.12½	13.95	11.37½
Heavy melting steel, Chicago	16.50	17.00	16.25	13.40
Rail for rolling, Chicago	18.75	17.50	16.95	14.25
Railroad steel specialties, Chicago	18.75	19.00	17.75	14.45

Coke

Connellsville furnace, ovens	$4.00	$4.00	$4.00	$3.50
Connellsville, foundry, ovens	4.25	4.40	4.25	4.00
Chicago, by-product foundry, del.	10.25	9.75	9.75	9.75

Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Prices Subject to Quantity Extras and Deductions (Except Galvanized)

Hot Rolled No. 10, 24-48 in.

Pittsburgh	2.15c
Gary	2.25c
Chicago, delivered	2.28c
Detroit, del.	2.35c
New York, del.	2.48c
Philadelphia, del.	2.44c
Birmingham	2.30c
St. Louis, del.	2.48c
Pacific ports, f.o.b. cars, dock	2.70c

Hot Rolled Annealed No. 24

Pittsburgh	2.80c
Gary	2.90c
Chicago, delivered	2.93c
Detroit, delivered	3.00c
New York, del.	3.13c
Philadelphia, del.	3.09c
Birmingham	2.95c
St. Louis, del.	3.135c
Pacific ports, f.o.b. cars, dock	3.45c

Galvanized No. 24

Pittsburgh	3.40c
Gary	3.50c
Chicago, delivered	3.53c
Philadelphia, del.	3.69c
New York, delivered	3.73c
Birmingham	3.55c
St. Louis, del.	3.735c
Pacific ports, f.o.b. cars, dock	4.00c

Tin Mill Black No. 28

Pittsburgh	2.95c
Gary	3.05c
St. Louis, delivered	3.28c

Cold Rolled No. 10

Pittsburgh	2.80c
Gary	2.90c
Detroit, delivered	3.00c
Philadelphia, del.	3.09c
New York, del.	3.13c
Pacific ports, f.o.b. cars, dock	3.40c

Cold Rolled No. 20

Pittsburgh	3.25c
Gary	3.35c
Detroit, delivered	3.45c
Philadelphia, del.	3.54c
New York, del.	3.58c

Enameling Sheets

Pittsburgh, No. 10	2.60c
Pittsburgh, No. 20	3.20c
Gary, No. 10	2.70c
Gary, No. 20	3.30c

Tin and Terne Plate

Gary base, 10 cents higher.

Tin plate, coke base (box) Pittsburgh	$4.85
Do., waste-waste	2.75c
Do., strips	2.50c
Long ternes, No. 24 unassorted, Pitts.	3.50c
Do., Gary	3.60c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold stp.	20.50	22.00	27.00	35.00

Steel Plate

Pittsburgh	2.05c
New York, del.	2.33c
Philadelphia, del.	2.23½c
Boston, delivered	2.45c
Buffalo, delivered	2.30c
Chicago or Gary	2.10c
Cleveland, del.	2.24½c
Birmingham	2.20c
Coatesville, base	2.15c
Sparrows Pt., base	2.15c
Pacific ports, f.o.b. cars, dock	2.60c
St. Louis, delivered	2.33c

Structural Shapes

Pittsburgh	2.05c
Philadelphia, del.	2.25½c
New York, del.	2.30¼c
Boston, delivered	2.45½c
Bethlehem	2.15c
Chicago	2.10c
Cleveland, del.	2.25c
Buffalo	2.15c
Gulf Ports	2.45c
Birmingham	2.20c
Pacific ports, f.o.b. cars, dock	2.60c

Bars

Soft Steel
(Base, 3 to 25 tons)

Pittsburgh	2.20c
Chicago or Gary	2.25c
Duluth	2.35c
Birmingham	2.35c
Cleveland	2.25c
Buffalo	2.30c
Detroit, delivered	2.35c
Pacific ports, f.o.b. cars, dock	2.75c
Philadelphia, del.	2.49c
Boston, delivered	2.60c
New York, del.	2.53c
Pitts., forg. qual.	2.55c

Rail Steel
To Manufacturing Trade

Pittsburgh	2.05c
Chicago or Gary	2.10c
Moline, Ill.	2.10c
Cleveland	2.10c
Buffalo	2.15c

Iron

Terre Haute, Ind.	2.10c
Chicago	2.15c
Philadelphia	2.39c
Pittsburgh, refined	2.75-7.50c

Reinforcing

New billet, straight lengths, quoted by distributors

Pittsburgh	2.25c
Chicago, Gary, Buffalo Cleve., Birm., Young...	2.25c
Gulf ports	2.45c
Pacific coast ports f.o.b. car docks	2.45c
Philadelphia, del.	2.54c

Rail steel, straight lengths, quoted by distributors

Pittsburgh	2.05c
Chicago, Buffalo, Cleveland, Birm., Young	2.10c
Gulf ports	2.30c

Wire Products

Prices apply to straight or mixed carloads; less carloads $4 higher; less carloads fencing $5 over base column.

Base Pitts.-Cleve. 100 lb. keg.

Standard wire nails	$2.25
Cement coated nails	$2.25
Galv. nails, 15 gage and coarser	$4.25
do. finer than 15 ga.	$4.75

(Per pound)

Polished staples	2.95c
Galv. fence staples	3.20c
Barbed wire, galv.	2.75c
Annealed fence wire	2.90c
Galv. fence wire	3.30c
Woven wire fencing (base column, c. l.)	$63.00

To Manufacturing Trade

Plain wire,, 6-9 ga	2.60c

Anderson, Ind. (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire, Pitts. or Cleveland	3.20c

Do., Chicago up $1, Worc. $2.

Cold-Finished Carbon Bars and Shafting

Base, Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,000 lbs.	2.55c
20,000 to 59,999 lbs.	2.50c
60,000 to 99,999 lbs.	2.45c
100,000 to 299,999 lbs.	2.42½c
300,000 lbs. and over	2.40c

Gary, Ind., Cleve., Chi., up 5c; Buffalo, up 10c; Detroit, up 15c; eastern Michigan, up 20c.

Alloy Steel Bars (Hot)

(*Base, 3 to 25 tons*)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.75c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.50
4600 0.20 to 0.30 Mo. 1.25-1.75 Ni.	1.05
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring	base
6100 bars	1.10
6100 spring	0.70
Cr., Ni., Van.	1.40
Carbon Van.	0.85
9200 spring flats	base
9200 spring rounds, squares	0.25

Piling

Pittsburgh	2.40c
Chicago, Buffalo	2.50c

Strip and Hoops

(Base, hot rolled, 25-1 ton)
(Base, cold-rolled, 25-3 tons)

Hot strip to 23⅞-in. Pittsburgh	2.15c
Chicago or Gary	2.25c
Birmingham base	2.30c
Detroit, del.	2.35c
Philadelphia, del.	2.44c
New York, del.	2.50c
Cooperage hoop, Pittsburgh	2.15c
Chicago	2.25c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland	2.85c
Detroit, del.	3.06c
Worcester, Mass.	3.05c

Carbon	Cleve. Pitts.	Worcester, Mass.
0.26—0.50	2.85c	3.05c
0.51—0.75	3.70c	3.90c
0.76—1.00	5.45c	5.65c
Over 1.00	7.50c	7.70c

Rails, Track Material

(Gross Tons)

Standard rails, mill	39.00
Relay rails, Pittsburgh, 20—100 lbs.	25.50-28.00
Light rails, billet qual.. Pittsburgh, Chicago	$35.00
Do., rerolling quality	34.00
Angle bars, billet, Gary, Pittsburgh, So. Chicago	2.70c
Do., axle steel	2.10c
Spikes, R. R. base	2.90c
Track bolts, base	4.00c
Tie plates, base	2.10c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs., inclusive up $2; 16 and 20 lbs. up $1; 12 lbs. up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade as per Dec. 1, 1932, lists:

Carriage and Machine

½ x 6 and smaller	70 off
Do. larger	65-10 off
Tire bolts	50-5 off

Plow Bolts

All sizes	65-10-10 off

Stove Bolts

In packages with nuts attached 72½ off; in packages with nuts separate 72½-5 off; in bulk 81½ off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.

Step bolts	60 off
Elevator bolts	60 off

Nuts

S. A. E. semifinished hex.: ½ to ⅞-inch	60-20-5 off
Do., ⅛ to 1-inch	60-20-5 off
Do., over 1-inch	60-20-5 off

Hexagon Cap Screws

Milled	50-10 off
Upset, 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	75 off
Headless set screws	75 off

Rivets, Wrought Washers

Structural, Pittsburgh, Cleveland	3.25c
Structural, Chicago	3.35c
⅞-inch and smaller, Pitts., Chi., Cleve.	70-5 off
Wrought washers, Pitts., Chi., Phila. to jobbers and large nut, bolt mfrs.	$6 off

Cut Nails

Cut nails, Pitts. (10% discount of size extras)	$3.40
Do., less carloads, 5 kegs or more, no discount on size extras	$3.40
Do., under 5 kegs, no disc on size extras	$3.55

Pipe and Tubing

Base $200 net ton, except on less boiler tubes under 2 inches and cold drawn seamless.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ less. Wrought pipe, Pittsburgh.

Butt Weld

Steel

In.	Blk.	Galv.
¼ and ⅜	60	44½
½	64½	55
¾	67½	59
1—3	69½	61½

Iron

⅛	31½	15
¼	36½	20½
1—1¼	39½	25½
2	41½	26

Lap Weld

Steel

2	62	53½
2½—3	65	56½
3½—6	67	58½
7 and 8	66	56½
9 and 10	65½	56

Iron

2	37	22½
2½—3½	38	25
4—8	40	28½

Line Pipe

Steel

⅛, butt weld	56
¼ and ⅜, butt weld	59
½, butt weld	63½
¾, butt weld	66½
1 to 3, butt weld	68½
2, lap weld	61
2½ to 3, lap weld	64
3½ to 6, lap weld	66
7 and 8, lap weld	65

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6-inch 2 pts. over discounts for same sizes, standard pipe lists, 8—12-inch, no extra.

Boiler Tubes

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		Charcoal Iron	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 pts. under base.

Seamless Boiler Tubes

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound. Less-carloads revised as of July, 1, 1935, card.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices being on lb. and 100 ft. basis.

Seamless Tubing

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$41.00-42.00
4-in., Birmingham	44.00-45.00
4-in., Chicago	52.40-53.40
6 to 24-in., Chicago	49.40-50.40
6-in & over, east. fdy.	45.00
Do., 4-in.	46.00

Class A pipe $3 over Class B

Stnd. fitgs., Birm. base	$100.00

Semifinished Steel

Billets and Blooms

4 x 4-*inch base; gross ton*

Pitts., Chi., Cleve., Buffalo and Young.	$34.00
Philadelphia	39.30
Duluth	36.00

Forging Billets

6 x 6 *to* 9 x 9-*in., base*

Pitts., Chicago, Buffalo	40.00
Forging, Duluth	42.00

Sheet Bars

Pitts., Cleve., Young., Sparrows Point	34.00

Slabs

Pitts., Chicago, Cleveland, Youngstown	$34.00

Wire Rods

Pitts., Cleve., No. 5 to ⅝-inch incl	43.00
Do., over ⅝ to 41/64-inch incl.	45.00

Chicago up $1; Worcester up $2.

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Pt.	1.80c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$3.90- 4.10
Connellsville, fdry.	4.50- 4.75
Connell. prem. fdry.	5.50
New River fdry.	6.00
Wise county fdry.	4.45- 5.00
Wise county fur.	4.00- 4.50

By-Product Foundry

Newark, N. J., del.	10.17-10.60
Chi., ov., outside del.	9.50
Chicago, del.	10.25
New England, del.	12.00
St. Louis, del.	10.00-10.50
Birmingham, ovens	6.50
Indianapolis, del.	9.40
Cincinnati, del.	9.50
Cleveland, del.	10.30
Buffalo, del.	10.50
Detroit, del.	10.70
Philadelphia, del.	9.85

Coke By-Products

Spot. gal. Producers' Plants

Pure and 90% benzol	16.00c
Toluol	30.00c
Solvent naphtha	30.00c
Industrial xylol	30.00c

Per lb. f.o.b. Frankford

Phenol (200 lb. drums)	15.50c
Do., (450 lbs.)	14.50c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls., to jobbers	7.25c

Per 100-lbs. Atlantic seaboard

Sulphate of ammonia	$1.30

†Western prices, ½-cent up.

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$22.00	$22.50	$21.50	$23.00
Birdsboro, Pa.	22.00	22.50	21.50	23.00
Birmingham, Ala.‡	17.38	. . .	16.38	22.50
Buffalo	21.00	21.50	20.00	22.00
Chicago	21.00	21.00	20.50	21.50
Cleveland	20.50	20.50	20.00	21.00
Detroit	21.00	21.00	20.50	21.50
Duluth	21.50	21.50	. .	22.00
Erie, Pa.	21.00	21.50	20.50	22.00
Everett, Mass.	22.75	23.25	22.25	23.75
Hamilton, O.	21.00	21.00	20.50	. . . .
Jackson, O.	20.25	20.25	19.75	. . . .
Neville Island, Pa.	21.00	21.00	20.50	21.50
Provo, Utah	18.50	. .	18.00	. .
Sharpsville, Pa.	21.00	21.00	20.50	21.50
Sparrows Point, Md.	22.00	.	21.50	.
Swedeland, Pa.	22.00	22.50	21.50	23.00
Toledo, O.	21.00	21.00	20.50	21.50
Youngstown, O.	21.00	21.00	20.50	21.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Akron, O., from Cleveland	21.76	21.76	21.26	22.26
Baltimore from Birmingham	22.58	. . . .	21.46	. . . . .
Boston from Birmingham	23.37	.	22.87	. . . .
Boston from Everett, Mass.	23.25	23.75	22.75	24.25
Boston from Buffalo	23.25	23.75	22.75	24.25
Brooklyn, N. Y., from Bethlehem	24.27	24.77	. . . .	. . . .
Brooklyn, N. Y., from Bmghm.	24.05	. . . .	. . . .	. . . .
Canton, O., from Cleveland	21.76	21.76	21.26	22.26
Chicago from Birmingham	21.22	. . .	21.10	. . . .
Cincinnati from Hamilton, O.	20.82	21.58	21.08	. . . .
Cincinnati from Birmingham	20.69	. . . .	19.69	. . . .
Cleveland from Birmingham	21.12	. . . .	20.62	. . . .
Cincinnati from Hamilton, O.	21.07	21.79	20.07	. . . .
Mansfield, O., from Toledo, O.	22.76	22.76	22.26	22.26
Milwaukee from Chicago	22.00	22.00	21.50	22.00
Muskegon, Mich., from Chicago, Toledo or Detroit	23.90	23.90	23.40	24.40
Newark, N. J., from Birmingham	23.01	. . . .	. . . .	. . . .
Newark, N. J., from Bethlehem	23.39	23.89	. . . .	. . . .
Philadelphia from Birmingham	22.38	. . . .	22.26	. . . .
Philadelphia from Swedeland, Pa.	22.76	23.26	22.26	. . . .
Pittsburgh district from Neville Island	Neville base plus 67c, 81c and $1.21 switching charges			
Saginaw, Mich., from Detroit	23.25	23.25	22.75	22.75
St. Louis, northern	21.50	21.50	21.00	. . . .

Delivered from Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis from Birmingham	†21.18	. . . .	21.00	. . . .
St. Paul from Duluth	22.94	22.94	. . . .	23.44

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $25.50, Phila. base, standard and copper bearing, $26.63.

Gray Forge		Charcoal	
Valley furnace	$20.50	Lake Superior fur.	$23.50
Pitts. dist. fur.	20.50	do., del. Chicago	26.04
		Lyles, Tenn.	24.00

Silvery†

Jackson county, O., base: 6-6.50 per cent $24.00; 6.51-7—$24.50; 7-7.50—$25.00; 7.51-8—$25.50; 8-8.50—$26.00; 8.51-9—$26.50; 9-9.50—$27.00; Buffalo $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base: Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$58.90

First Quality

Pa., Ill., Md., Mo., Ky.	$45.60
Alabama, Georgia	$38.00-45.00

Second Quality

Pa., Ill., Ky., Md., Mo.	40.85
Georgia, Alabama	36.10

Ohio

First quality	$40.85
Intermediary	38.00
Second quality	29.45

Malleable Bung Brick

All bases	54.15

Silica Brick

Pennsylvania	$45.60
Joliet, E. Chicago	54.15
Birmingham, Ala.	45.60

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$25.00
Wire cut	23.00

Magnesite

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	42.00
Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)	24.00

Base Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$47.00
Chem. bonded chrome	47.00
Magnesite brick	67.00
Chem. bonded magnesite	57.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$23.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$18.00
Do., for barge	$19.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	80.00
Do., Baltimore, base	80.00
Do., del. Pittsburgh	85.13
Spiegeleisen, 19-20% dom. Palmerston, Pa., spot	†26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight allowed, c. l.	69.50
Do., less carload	77.00
Do., 75 per cent	126-130.00
Spot, $5 a ton higher.	
Silicoman., 2½ carbon	89.00
2% carbon, 94.00; 1%,	104.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.00
Ferrotungsten, stand., lb. con. del.	1.30-1.40
Ferrovanadium, 35 to 40% lb., cont.	2.70-2.90
Ferrotitanium, c. l., prod. plant, frt. all., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, $3 unitage	58.50
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $3 unitage	75.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads. Quan. diff. apply.

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Chinese Spot, N. Y.	Nickel Cathodes
Dec. 23	11.62½	11.75	11.25	51.90	51.55	6.00	5.85	5.45	*19.00	13.25	35.00
Dec. 24	11.62½	11.75	11.25	51.90	51.55	6.00	5.85	5.45	*19.00	13.25	35.00
Dec. 25—Holiday						6.00	5.85	5.45	*19.00	13.25	35.00
Dec. 26	11.62½	11.75	11.25	51.90	51.55	6.00	5.85	5.45	*19.00	13.25	35.00
Dec. 28	11.62½	11.75	11.25	52.25	52.05	6.00	5.85	5.45	*19.00	13.25	35.00
Dec. 29	11.62½	11.75	11.25	51.50	51.35	6.00	5.85	5.45	*19.00	13.75	35.00

*Nominal range 19.00 to 21.00c.

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 11.62½c Conn. copper

Sheets

Yellow brass (high)	17.25
Copper, hot rolled	19.37½
Lead, cut to jobbers	9.50
Zinc, 100-lb. base	10.00

Tubes

High yellow brass	19.50
Seamless copper	18.87½

Rods

High yellow brass	15.25
Copper, hot rolled	16.12½

Anodes

Copper, untrimmed	16.87½

Wire

Yellow brass (high)	17.50

OLD METALS

Deal. buying prices, cents lb.

No. 1 Composition Red Brass

*New York	8.00-8.12½
Cleveland	8.25- 8.50
*Chicago	7.75- 8.00
*St. Louis	7.87½-8.12½

Heavy Copper and Wire

*New York, No. 1	9.75-9.87½
Chicago, No 1	9.37½-9.62½
Cleveland, No. 1	9.50-9.87½
*St. Louis, No. 1	9.50- 9.75

Composition Brass Borings

New York	7.62½- 7.75

Light Copper

*New York	8.25-8.37½
*Chicago	7.62½-7.87½
Cleveland	7.75- 8.00
*St. Louis	7.75- 8.00

Light Brass

*Chicago	5.00- 5.25
Cleveland	5.00- 5.25
*St. Louis	4.87½-5.12½

Lead

*New York	5.12½- 5.25
Cleveland	4.75- 5.00
*Chicago	4.85- 5.10
*St. Louis	4.50-5.12½

Zinc

*New York	3.00-3.12½
*St. Louis	3.12½- 3.25
Cleveland	3.00- 3.25

Aluminum

Borings, Cleve.	9.75-10.00
Mixed, cast, Cleve.	13.25-13.50
Mixed, cast St. L.	13.00-13.25
Clips, soft, Cleve.	14.75-15.00

SECONDARY METALS

Brass, ingot, 85-5-5-5, l.c.l.	12.25
Stand. No. 12 alum.	17.00-17.50

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS

Baltimore*	3.20c
Boston††	3.60c
Buffalo	3.10c
Chattanooga	3.56c
Chicago (j)	3.35c
Cincinnati	3.55c
Cleveland	3.25c
Detroit	3.29c
Houston	3.10c
Los Angeles	3.80c
Milwaukee	3.46c-3.61c
New Orleans	3.70c
New York‡ (d)	3.62c
Pitts. (h)	3.30c-3.45c
Philadelphia*	3.45c
Portland	3.75c
San Francisco	3.85c
Seattle	4.10c
St. Louis	3.45c
St. Paul	3.60c-3.75c
Tulsa	3.35c

IRON BARS

Portland	3.50c
Chattanooga	3.56c
Baltimore*	3.10c
Cincinnati	3.55c
New York‡ (d)	3.15c
Philadelphia*	3.45c
St. Louis	3.45c
Tulsa	3.35c

REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.56c
Cleveland (c)	2.25c
Cincinnati	3.40c
Houston	3.25c
Los Angeles, c.l.	2.45c
New Orleans*	2.67c
Pitts., plain (h)	3.25c
Pitts., twisted squares (h)	3.40c
San Francisco	2.45c
Seattle	3.75c
St. Louis	3.35c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES

Baltimore*	3.10c
Boston††	3.59c
Buffalo	3.35c
Chattanooga	3.66c
Chicago	3.45c
Cincinnati	3.65c
Cleveland	3.56c
Detroit	3.52c
Houston	3.10c
Los Angeles	3.80c
Milwaukee	3.56c
New Orleans	3.80c
New York‡ (d)	3.62c
Philadelphia*	3.30c
Pittsburgh (h)	3.40c
Portland (i)	3.75c
San Francisco	3.75c
Seattle (i)	3.95c
St. Louis	3.55c
St. Paul	3.70c
Tulsa	3.60c

PLATES

Baltimore*	3.10c
Boston††	3.61c
Buffalo	3.47c
Chattanooga	3.66c
Chicago	3.45c
Cincinnati	3.65c
Cleveland, ¼-in. and over	3.56c
Detroit	3.52c
Detroit, 5/16-in.	3.85c
Houston	3.10c
Los Angeles	3.60c
Milwaukee	3.41c
New Orleans	3.80c
New York‡ (d)	3.65c
Philadelphia*	3.30c
Phila. floor	4.95c
Pittsburgh (h)	3.40c
Portland	3.75c
San Francisco	3.75c
Seattle	3.95c
St. Louis	3.55c
St. Paul	3.55c
Tulsa	3.60c

NO. 10 BLUE

Baltimore*	3.20c
Boston (g)	3.75c
Buffalo	3.72c
Chattanooga	3.46c
Chicago	3.35c
Cincinnati	3.50c
Cleveland	3.41c
Det. 8-10 ga.	3.24c
Houston	3.45c
Los Angeles	3.90c
Milwaukee	3.46c
New Orleans	3.85c
New York‡ (d)	3.57c
Portland	3.85c
Philadelphia*	3.45c
Pittsburgh (h)	3.25c
San Francisco	3.95c
Seattle	4.10c
St. Louis	3.40c
St. Paul	3.60c
Tulsa	3.80c

NO. 24 BLACK

Baltimore*†	3.80c
Boston (g)	4.35c
Buffalo	3.35c
Chattanooga*	3.36c
Chicago	3.75c-4.75c
Cincinnati	4.05c
Cleveland	4.31c
Detroit	4.14c
Los Angeles	4.35c
Milwaukee	4.36c
New Orleans*	3.52c
New York‡ (d)	4.22c
Philadelphia*†	4.15c
Pitts.** (h)	3.65c-4.95c
Portland	4.30c
Seattle	4.85c
San Francisco	4.65c
St. Louis	3.30c
St. Paul	4.30c
Tulsa	4.85c

NO. 24 GALV. SHEETS

Baltimore*†	3.90c
Buffalo	4.10c
Boston (g)	4.35c
Chattanooga*	3.96c
Chicago (h)	4.35c-5.35c
Cincinnati	4.65c
Cleveland	4.91c
Detroit	4.82c
Houston	4.50c
Los Angeles	4.60c
Milwaukee	4.96c
New Orleans*	4.32c
New York‡ (d)	4.50c
Philadelphia*†	4.80c
Pitts.** (h)	4.50c-4.75c
Portland	4.60c
San Francisco	5.25c
Seattle	5.30c
St. Louis	4.90c
St. Paul	5.10c
Tulsa	5.20c

BANDS

Baltimore*	3.30c
Boston††	3.75c
Buffalo	3.52c
Chattanooga	3.71c
Cincinnati	3.75c
Cleveland	3.66c
Chicago	3.60c
Detroit, 5/16-in. and lighter	3.49c
Houston	3.35c
Los Angeles	4.30c
Milwaukee	3.71c
New Orleans	4.25c
New York‡ (d)	3.82c
Philadelphia*	3.55c
Pittsburgh (h)	3.50c
Portland	4.35c
San Francisco	4.45c
Seattle	4.60c
St. Louis	3.65c
St. Paul	3.85c
Tulsa	3.55c

HOOPS

Baltimore	3.55c
Boston††	4.75c
Buffalo	3.52c
Chicago	3.60c
Cincinnati	3.75c
Detroit, No. 14 and lighter	3.49c
Los Angeles	6.05c
Milwaukee	3.71c
New York‡ (d)	3.66c
Philadelphia*	3.80c
Pittsburgh (h)	4.00c
Portland	5.85c
San Francisco	6.50c
Seattle	5.95c
St. Louis	3.65c
St. Paul	3.85c

COLD FIN. STEEL

Baltimore (c)	3.98c
Boston*	4.15c
Buffalo (h)	3.70c
Chattanooga*	4.38c
Chicago (h)	3.95c
Cincinnati	4.15c
Cleveland (h)	3.95c
Detroit	3.84c
Los Ang. (f) (d)	6.10c
Milwaukee	4.06c
New Orleans	4.55c
New York‡ (d)	4.22c
Philadelphia*	4.18c
Pittsburgh	3.80c
Portland (f) (d)	6.25c
San Fran. (f) (d)	6.30c
Seattle (f) (d)	6.40c
St. Louis	4.00c
St. Paul	4.20c
Tulsa	4.80c

COLD ROLLED STRIP

Boston	3.495c
Buffalo	3.39c
Chicago	3.45c
Cincinnati (b)	3.47c
Cleveland (b)	3.20c
Detroit	3.18c
New York‡ (d)	3.57c
St. Louis	3.41c

TOOL STEELS

(Applying on or east of Mississippi river; west of Mississippi 1c up.)

	Base
High speed	59½c
High carbon, high chrome	39c
Oil hardening	23c
Special tool	21c
Extra tool	17¾c
Regular tool	14½c

Uniform extras apply.

BOLTS AND NUTS

(100 pounds or over)

	Discount
Chicago (a)	65
Cleveland	70
Detroit	70
Milwaukee	70
Pittsburgh	65-5

(a) Under 100 lbs., 60 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Quantity base; (e) New mill classif. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 in.; (j) Shapes other than rounds, flats, fillet angles, 3.50c.

Prices on heavier lines are subject to new quantity differentials: 399 lbs. and less, up 50 cts.; 400 to 3999 lbs., base; 4000 to 7999 lbs., 15 cts., under; 8000 to 14,999 lbs., 25 cts. under; 15,000 to 39,999 lbs., 35 cents under; 40,000 lbs. and over 50 cts. under; (except Boston).

‡Domestic steel; *Plus quantity extras; **Under 25 bundles; *†50 or more bundles; †New extras apply; ††Base 8000 lbs., extras on less.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Dec. 29

Export Prices f. o. b. Ship at Port of Dispatch—(By Cable or Radio)

	British gross tons U. K. ports		Continental Channel or North Sea ports, metric tons	
			Quoted in dollars at current value	**Quoted in gold pounds sterling
PIG IRON	£ s d			£ s d
Foundry, 2.50-3.00 Silicon	$22.10	4 10 0*	$15.25	1 17 6
Basic bessemer	22.10	4 10 0*	13.43	1 13 0
Hematite, Phos. .03-.05	18.41	3 15 0	.....	.....
SEMIFINISHED STEEL				
Billets	$28.85	5 17 6	$19.10	2 7 0
Wire rods, No. 5 gage	43.94	8 19 0	37.68	5 2 6
FINISHED STEEL				
Standard rails	$40.50	8 5 0	$44.74	5 10 0
Merchant bars	1.86c	8 10 0	1.29c to 1.48c	3 10 0 to 4 0 0
Structural shapes	1.86c	8 10 0	1.29c to 1.48c	3 10 0 to 4 0 0
Plates, †¼-in. or 5 mm.	2.10c	9 11 3	1.60c to 1.84c	4 7 6 to 5 0 0
Sheets, black, 24 gage or 0.5 mm	2.52c	11 10 0	2.49c	6 15 0††
Sheets, gal., 24 gage, corr.	3.01c	13 15 0	2.94c	8 0 0
Bands and strips	2.08c	9 10 0	1.75c	4 15 0
Plain wire, base	2.30c	10 10 0	1.94c	5 5 0
Galvanized wire, base	2.74c	12 10 0	2.15c	5 17 6
Wire nails, base	2.63c	12 0 0	1.75c	4 15 0
Tin plate, box 108 lbs.	$ 4.85	0 19 9	.....	.....

British ferromanganese $80 delivered Atlantic seaboard, duty-paid. Germ.n ferromanganese £9 0s 0d ($43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

		£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$19.89	4 1 0	(a) $16.43	351	$16.56	490	$25.37	63
Basic bessemer pig iron	18.41	3 15 0	(a) 13.47	275	14.70	435	27.98	(b) 69.50
Furnace coke	5.28	1 1 6	5.94	127	4.63	137	7.65	19
Billets	30.07	6 2 6	23.73	507	19.60	580	38.85	96.50
Standard rails	1.81c	8 5 0	1.49c	711	1.73c	1,150	2.38c	132
Merchant bars	2.05c	9 7 0	1.46c	695	1.05c	700	1.98c	110
Structural shapes	2.06c	9 7 6	1.43c	680	1.05c	700	1.93c	107
Plates, †¼-in. or 5 mm.	2.12c	9 13 9	1.84c	878	1.28c	850	2.29c	127
Sheets, black	2.63c	12 0 0§	2.42c	1,150‡	1.39c	925‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm	3.07c	14 0 0	3.47c	1,650	2.85c	1,900	6.66c	370
Plain wire	2.41c	11 0 0	2.50c	1,190	1.95c	1,300	3.11c	173
Bands and strips	2.21c	10 2 0	1.69c	802	1.28c	850	2.29c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. a del. Middlesbrough. b hematite. ††Close annealed.

**Gold pound sterling carries a premium of 66.66 per cent over paper sterling.

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; † indicates brokers prices

HEAVY MELTING STEEL

Birmingham†	12.50-13.50
Bos. dock, No. 1, exp.	†13.50
N. Eng. del. No. 1	13.50
Chicago, No. 1	17.50-18.00
Buffalo No. 1	17.00-17.50
Buffalo, No. 2	15.50-16.50
Chicago	17.50-18.00
Cleveland, No. 1	17.50-18.00
Cleveland, No. 2	16.50-17.00
Detroit, No. 1	15.00-15.50
Eastern Pa., No. 1	16.00-16.50
Eastern Pa., No. 2	14.50-15.00
Federal, Ill.	14.25-14.75
Granite City, R. R.	15.50-16.00
Granite City, No. 2	14.25-14.75
New York, No. 1	†13.00-13.50
N. Y. dock, No. 1 exp.	†12.50
Pitts., No. 1 (R. R.)	20.00-20.50
Pitts., No. 1 (dlr.)	19.25-19.75
Pittsburgh, No. 2	17.00-17.50
St. Louis, R. R.	16.25-16.75
St. Louis, No. 2	14.25-14.75
Toronto, dlrs. No. 1	10.50-11.00
Toronto, No. 2	9.50-10.00
Valleys, No. 1	18.00-18.50

COMPRESSED SHEETS

Buffalo, dealers	15.50-16.00
Chicago, factory	16.50-17.00
Chicago, dealer	14.50-15.00
Cleveland	17.00-17.50
Detroit	15.50-16.00
E. Pa., new mat	15.50-16.00
E. Pa., old mat.	13.50
Pittsburgh	19.25-19.75
St. Louis	12.00-12.50
Valleys	17.75-18.00

BUNDLED SHEETS

Buffalo	13.50-14.00
Cincinnati, del.	12.00-12.50
Cleveland	13.50-14.50
Pittsburgh	17.50-18.00
St. Louis	10.00-10.50
Toronto, dealers	4.50

SHEET CLIPPINGS, LOOSE

Chicago	11.50-12.00
Cincinnati	11.00-11.50
Detroit	12.00-12.50
St. Louis	9.50-10.00

STEEL RAILS, SHORT

Birmingham	15.00-16.00
Buffalo	19.00-20.00
Chicago (3 ft.)	19.50-20.00
Chicago (2 ft.)	21.50-22.00
Cincinnati, del.	19.00-19.50
Detroit	17.50-18.00
Pitts., open-hearth, 3 ft. and less	22.00-22.50
St. Louis, 2 ft. & less	17.00-17.50

STEEL RAILS, SCRAP

Boston district	†12.25-12.75
Buffalo	17.00-17.50
Chicago	17.50-18.00
Pittsburgh	20.00-20.50
St. Louis	16.50-17.00
Toronto, dealers	8.50

STOVE PLATE

Birmingham	8.50- 9.00
Boston district	†8.75- 9.00
Buffalo	13.00-13.50
Chicago	9.50-10.00
Cincinnati, dealers	10.75-11.25
Detroit, net	10.00-10.50
Eastern Pa.	13.50-14.00
New York, fdry.	†10.00
St. Louis	10.00-10.50
Toronto, deal'rs, net	5.50- 6.00

SPRINGS

Buffalo	18.00-18.50
Chicago, leaf	19.00-19.50
Chicago, coil	21.50-22.00
Eastern Pa.	21.00-22.00
Pittsburgh	23.50-24.00
St. Louis	18.00-18.50

ANGLE BARS—STEEL

Chicago	19.00-19.50
St. Louis	16.75-17.25
Buffalo	14.50-15.00

RAILROAD SPECIALTIES

Chicago	19.00-19.50

LOW PHOSPHORUS

Buffalo, billet and bloom crops	20.00-21.00
Cleveland, billet, bloom crops	21.00-21.50
Eastern Pa., crops	21.50
Pittsburgh, billet, bloom crops	23.50-24.00
Pittsburgh, sheet bar crops	22.00-22.50

FROGS, SWITCHES

Chicago	17.50-18.00
St. Louis, cut	16.00-16.50

SHOVELING STEEL

Chicago	17.50-18.00
Federal, Ill.	14.25-14.75
Granite City, Ill.	14.25-14.75
Toronto, dealers	6.50

RAILROAD WROUGHT

Birmingham	9.00-10.00
Boston, district	†8.00- 8.25
Buffalo, No. 1	15.50-16.00
Buffalo, No. 2	16.50-17.50
Chicago, No. 1, net	15.00-15.50
Chicago, No. 2	17.50-18.00
Cincinnati, No. 2	16.00-16.50
Eastern Pa.	16.50-17.00
St. Louis, No. 1	13.50-14.00
St. Louis, No. 2	16.00-16.50
Toronto, No. 1 dlr.	7.00

SPECIFICATION PIPE

Eastern Pa.	15.00
New York	†10.50-11.00

BUSHELING

Buffalo, No. 1	15.00-15.50
Chicago, No. 1	15.50-16.00
Cincin., No. 1, deal.	12.25-12.75
Cincinnati, No. 2	7.50- 8.00
Cleveland, No. 2	12.00-12.50
Detroit, No. 1, new	14.50-15.00
Valleys, new, No. 1	17.25-17.75
Toronto, dealers	6.00

MACHINE TURNINGS

Birmingham	6.00- 6.50
Buffalo	10.50-11.00
Chicago	8.50- 9.00
Cincinnati, dealers	9.50-10.00
Cleveland	11.00-11.50
Detroit	9.50-10.00
Eastern Pa.	11.00-11.50
New York	†7.50- 8.00
Pittsburgh	14.00-14.50
St. Louis	7.25- 7.75
Toronto, dealers	4.00- 4.50
Valleys	11.00-11.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†6.40- 7.90
Buffalo	10.50-11.00
Cincinnati, dealers	9.50-10.00
Cleveland	12.00-12.50
Detroit	10.50-11.00
Eastern Pa.	10.50-11.00
New York	†6.50- 7.00
Pittsburgh	14.50-15.00
Toronto, dealers	4.00

CAST IRON BORINGS

Birmingham	6.00- 6.50
Boston dist. chem.	†7.75- 8.00
Boston dist. for mills	†7.75- 8.00
Buffalo	10.75-11.25
Chicago, dealers	9.50-10.00
Cincinnati, dealers	9.50-10.00
Cleveland	12.00-12.50
Detroit	10.50-11.00
E. Pa., chemical	11.50-13.00
New York	†7.50- 7.75
St. Louis	8.00- 8.50
Toronto, dealers	4.50- 5.00

PIPE AND FLUES

Cincinnati, dealers	9.75-10.25
Chicago, net	10.50-11.00

RAILROAD GRATE BARS

Buffalo	11.50-12.00
Chicago, net	11.50-12.00
Cincinnati	10.25-10.75
Eastern Pa.	14.00-14.50
New York	†8.50- 9.00
St. Louis	11.50-12.00

FORGE FLASHINGS

Boston district	†11.25-11.50
Buffalo	15.50-16.00
Cleveland	16.50-17.00
Detroit	14.00-14.50
Pittsburgh	17.50-18.00

FORGE SCRAP

Boston district	†6.50- 7.00
Chicago, heavy	19.00-19.50
Eastern Pa.	15.50-16.00

ARCH BARS, TRANSOMS

St. Louis	16.50-17.00

AXLE TURNINGS

Boston district	†9.00- 9.50
Buffalo	13.50-14.00
Chicago, elec. fur.	16.50-17.00
Eastern Pa.	14.50-15.00
St. Louis	11.50-12.00
Toronto	4.50

STEEL CAR AXLES

Birmingham	15.50-16.00
Boston district	†17.50-18.00
Buffalo	19.00-20.00
Chicago, net	19.50-20.00
Eastern Pa.	21.50
St. Louis	19.00-19.50
Toronto	8.50

SHAFTING

Boston district	†16.25-16.50
Eastern Pa.	22.00-22.25
New York	†17.00-17.50
St. Louis	15.00-15.50

CAR WHEELS

Birmingham	15.00-15.50
Boston dist. iron	†11.00-11.50
Buffalo, iron	16.50-17.00
Buffalo, steel	19.00-20.00
Chicago, iron	18.00-18.50
Chicago, rolled steel	19.50-20.00
Cincinnati, iron	17.50-18.00
Eastern Pa., iron	18.00-18.50
Eastern Pa., steel	21.00-22.00
Pittsburgh, iron	18.75-19.25
Pittsburgh, steel	23.00-23.50
St. Louis, iron	15.50-16.00
St. Louis, steel	17.75-18.25
Toronto, net	8.50

NO. 1 CAST SCRAP

Birmingham	13.75-14.50
Bos. dis. No. 1 mach.	†12.25-12.50
N. Eng., del. No. 2	†11.50-11.75
N. Eng., del. textile	14.00
Buffalo, cupola	15.25-15.75
Buffalo, mach.	16.25-16.75
Chicago, agri. net	12.50-13.00
Chicago, auto	13.50-14.00
Chicago, mach. net	15.00-15.50
Chicago, railr'd net	14.00-14.50
Cinci., mach. cup.	15.75-16.25
Cleveland, mach.	17.50-18.00
Eastern Pa., cupola	18.00-18.50
E. Pa., mixed yard	14.00-14.50
Pittsburgh, cupola	17.50-18.00
San Francisco, del.	13.50-14.00
Seattle	10.00-11.00
St. Louis, No. 1	13.25-13.75
St. L., No. 1, mach.	13.50-14.00
Toronto, No. 1, mach., net	9.50-10.00

HEAVY CAST

Boston, dist. break	†11.00-11.25
New England del.	13.00
Buffalo, break.	13.75-14.25
Cleveland, break	13.50-14.00
Detroit, No. 1 mach. net	13.50-14.00
Detroit, break.	12.50-13.00
Detroit, auto net	13.50-14.00
Eastern Pa.	16.50-17.00
New York, break.	†13.00-13.25
Pittsburgh	15.00-15.50

MALLEABLE

Birmingham, R. R.	14.00-14.50
New England, del.	†16.25-17.50
Buffalo	17.50-18.50
Chicago, R. R.	19.50-20.00
Cinci., agri. del.	14.75-15.25
Cleveland, rail.	18.00-18.50
Detroit, auto, net	14.50-15.00
Eastern Pa., R. R.	17.00-18.00
Pittsburgh, rail	18.50-19.00
St. Louis, R. R.	16.50-17.00
Toronto, net	7.00

RAILS FOR ROLLING

5 feet and over

Birmingham	15.00-15.50
Boston	†12.50-13.00
Buffalo	17.50-18.50
Chicago	18.50-19.00
Eastern Pa.	18.50-19.00
New York	†14.00-14.50
St. Louis	17.00-17.50

LOCOMOTIVE TIRES

Chicago (cut)	19.50-20.00
St. Louis, No. 1	14.50-15.00

LOW PHOS. PUNCHINGS

Buffalo	19.00-19.50
Chicago	20.50-21.00
Eastern Pa.	20.50-21.50
Pittsburgh (heavy)	22.00-22.50
Pittsburgh (light)	21.50-22.00

Iron Ore

Lake Superior Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ore

Cents, unit. del. E. Pa.

Foundry and basic 56.63% con. (nom.)	8.50- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

Foreign Ore

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	13.50
No. Afr. low phos.	13.50
Swedish low phos.	11.50
Spanish No. Africa basic, 50 to 60%	12.50
Tungsten, spot sh. ton unit, duty pd.	$15.85-16.00
N. F., fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	20.00-21.00

Manganese Ore

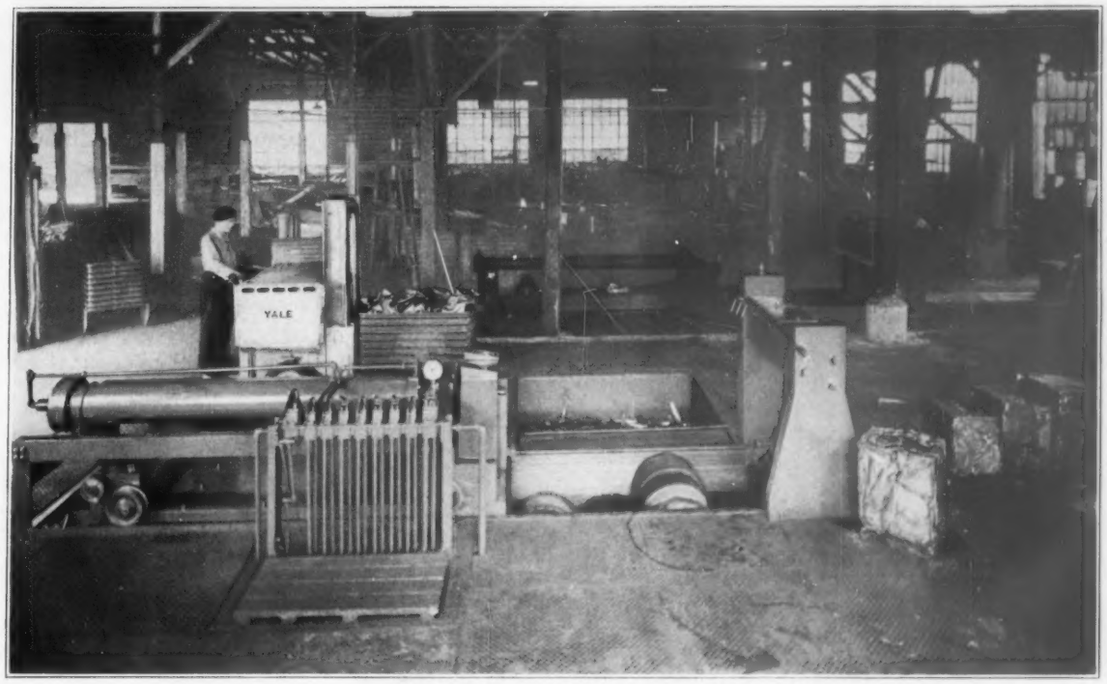
(Nominal)

Prices not including duty, cents per unit cargo lots.

Caucasian, 50-52%	30.00
So. African, 50-52%	30.00
Indian, 50-52%	30.00

LOGEMANN

Metal Baling Presses



Steel mills, automobile manufacturers, stamping plants and scrap yards bale their sheet scrap in LOGEMANN scrap metal presses. Baled scrap pays substantial dividends . . . . saves space . . . . can be more economically handled and loaded . . . . is practically free from corrosion and saves much heat in remelting . . . . can be held for favorable price periods.

LOGEMANN scrap metal presses are built in many sizes and several types, to meet specific conditions. The illustration shows two LOGEMANN installations in a prominent automobile plant . . . . in the background a two-ram unit for ordinary scrap . . . . a triple-compression press with special large box in foreground for bulky scrap, drums and large forms.

The LOGEMANN line includes baling presses for all materials . . . . high pressure pumps . . . . hydraulic straighteners . . . . hydraulic presses and fittings. Write for descriptive bulletins.

LOGEMANN BROTHERS COMPANY

3126 W. Burleigh St. Milwaukee, Wis.

Bars

Bar Prices, Page 380

Pittsburgh — Consumers of merchant steel bars continued efforts to place as much tonnage as possible through late last week. Many took the chance that the higher price would be applied after Feb. 1, while others placed specifications last week fully cognizant that 2.25c, Pittsburgh, would apply. This is due to practically all bar mills being sold out for at least three weeks in January.

Chicago — Bar specifications, including automotive, continue heavy, but possibility of a curtailment in motor car operations as a result of labor trouble in the glass industry clouds the outlook. Farm implement and tractor manufacturers are maintaining steady schedules, with heavier production in prospect this quarter. New bar business generally is for delivery in February since January capacity already has been absorbed. Higher prices are steady on new business.

Cleveland—Requirements for carbon steel bars, while showing the effects of inventory and general holiday curtailments, are still heavier than anticipated. Auto partsmakers, farm equipment, and nut and bolt manufacturers have been most active. Deliveries are well extended, and in some cases it is likely that producers will not begin to take advantage of the higher prices until early in March.

New York—Bar sellers generally are now on the new basis of 2.20c, Pittsburgh, or 2.53c, delivered, New York. As there was extensive covering last month, sellers look for a slowing up, although substantial business will likely be placed this month against identified projects and as deliveries have become considerably extended there will probably be some reasonably good buying in an effort to get further tonnage on mill schedules as soon as possible, particularly in view of the fact that consumption continues heavy.

Philadelphia — Commercial steel bars are now holding firmly at 2.20c, Pittsburgh, or 2.49c, delivered Philadelphia, allowing for the 2 cents per 100 pounds reduction resulting from the elimination of a freight surcharge Jan. 1. Following the heavy buying of the past month or so, before the $3 advance in the base price, new orders have tapered noticeably; however, January business is expected to be fairly brisk, by virtue of the combination of continued good consumption and extended deliveries.

TWENTY-ONE
BROSIUS TWO-MOTOR ELECTRIC MECHANICAL CLAY GUNS

have been sold since the first installation was made in 1934—SEVENTEEN of them since January 1st, this year.

Stopping under full wind pressure continuously is standard practice with this gun, and, if necessary, the hole can be stopped with iron flowing full.

The operation of the gun is controlled entirely from a remote control station, away from all danger. No clamping mechanism is used, the gun being pulled into the hole by a flat wire rope attached to the furnace front and a non-reversing (except by motor) winch in the end of the boom.

A nine cubic foot clay barrel provides ample clay to stop any hole, eliminating the necessity of adding clay to the barrel during the plugging operation.

OTHER PRODUCTS

Steam and Hydro-Electric. Clay Guns, Hand and Motor Operated Goggle Valves, Hot Blast Valves, Stock Line Indicators, Cinder Notch Stoppers, Flue Dust Conditioners, Blast Furnace Slag Granulating Machines, Coke Testing Tumbling Barrels, Single Hook Grab Buckets, Automatic Dump Buckets, Automatic Single Hoist Buckets, Overhead and Auto Floor Charging Machines for serving Heating and Melting Furnaces, Auto Floor Manipulators for serving Steam Hammers, Presses, etc.

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Brosius Equipment is patented in the United States and Foreign Countries

Plates

Plate Prices, Page 380

Pittsburgh — Warner Co., Philadelphia, has placed an order with Dravo Contracting Co., Neville Island, Pittsburgh, for six all-welded steel coal barges requiring about 1050 tons of plates. Two other barge contracts were also placed last week, one for Socony Vacuum Oil Co., New York, 800 tons for four barges for use on the Mississippi, Ohio, and Missouri rivers, and 450 tons in five sand and gravel barges for the Pfaff & Smith Builders & Supply Co., Charleston, W. Va. Kaw Point Boat & Motor Co., Kansas City, Mo., and Nashville Bridge Co., Nashville, Tenn., were respectively the successful bidders.

Chicago — Plate mills are sold until the middle of first quarter as a consequence of heavy bookings during recent weeks. Additional

business is in sight for railroad equipment still pending. Miscellaneous plate demand has been fairly active, though large individual projects are lacking in tanks and pipe lines.

Cleveland—The recent price advance of $3 a ton has driven in more tonnage than expected, thereby extending backlogs five to six weeks. Some producers expect December to be one of the best months of the year. Locomotive buying has offered much encouragement to fabricators here, giving some more business than they had during the last two years. The tonnage involved in ship repair work has not been allocated but some definite steps will probably be taken sometime this month.

Philadelphia—Plate sellers expect heavy acceptances on identified work to bolster business this month. Effective Jan. 1 producers generally are quoting on the basis of 2.15c, Coatesville, Pa., or 2.235c, delivered Philadelphia, this figure allowing for a reduction of ½-cent per 100 pounds due to the elimination of a freight surcharge.

On identified projects quoted on before announcement of the elimination of freight surcharges Jan. 1, for delivery after that time no reductions will be made to cover this revision in freight costs. The advantage will accrue to mills which absorbed the surcharge on such contracts at the time it was originally made effective.

New York—Plates are now on a new basis of 2.15c, Coatesville, Pa., or 2.33c, delivered, New York. Sellers here expect a decline in new business, although this month should witness the placing of heavy tonnages against identified projects under the 30-day protection clause.

Contracts Placed

1850 tons, welded pipe, San Gabriel dam, Los Angeles, to Western Pipe & Steel Co.

1670 tons, ten standard coal barges, for Campbell Transportation Co., Pittsburgh, to Bethlehem Steel Co., Bethlehem, Pa.

1050 tons, six all-welded coal barges, for Warner Co., Philadelphia, to Dravo Contracting Co., Neville Island, Pittsburgh.

800 tons, four oil barges for Socony Vacuum Oil Co., New York, to Kaw Point Boat & Motor Co., Kansas City.

500 tons, tanks, Standard Oil Co. of Indiana, to James G. Heggie & Sons Inc., Joliet, Ill.

450 tons, five 100 x 26 x 6½-foot sand and gravel barges, for Pfaff & Smith Builders & Supply Co., Charleston, W. Va., to Nashville Bridge Co., Nashville, Tenn.

255 tons, S. T. P. deck plate girder viaduct for C. & O. railroad, Boston, Ind., to Wisconsin Bridge & Iron Co, Milwaukee.

Contracts Pending

4000 tons, 25 standard coal barges, for Wheeling Steel Corp., Wheeling, W. Va.

1700 tons, 75 to 123-inch welded steel pipe, San Gabriel dam No. 1 pipe line, Los Angeles; Western Pipe & Steel Co., Los Angeles, low.

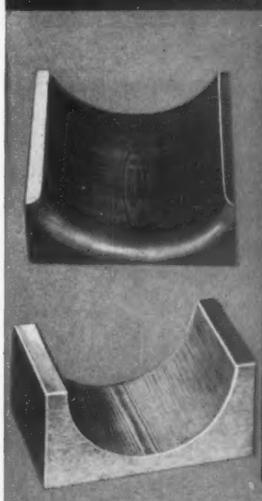
560 tons, 10 and 12-inch pipe for St. Maries, Idaho.; Beall Pipe & Tank Co., Portland, Oreg., low.

Unstated tonnage, one wrought iron hull barge, for Huntington, W. Va., engineers; bids postponed to Jan. 12.

Cold Finished

Pittsburgh—With the exception of agricultural implement manufacturers, and jobbers to an extent, advanced buying of cold-finished carbon steel bars up until the Dec. 31 deadline before the $4 a ton increase was disappointingly small. The result finds cold-finished bar producers with backlogs of little more than a month, where earlier expectations were that backlogs Jan. 1 would be two months to ten weeks at least. Makers of textile machinery, the automotive trade, and its partsmakers are adopting a policy of preferring to pay the higher market on a when-as-needed basis. As yet, however,

INSUROK
Plastic BEARINGS



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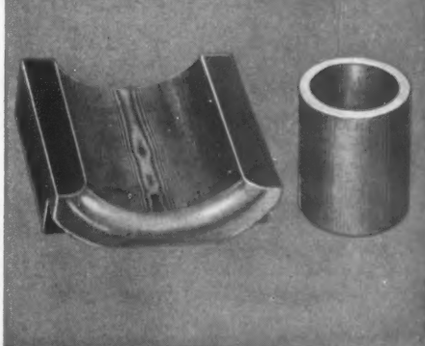

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Richardson Engineers will be glad to assist in the application of INSUROK Laminated plastic CG Bearings to your mechanical equipment. No obligation, of course. INSUROK Hand Book and Literature on request.

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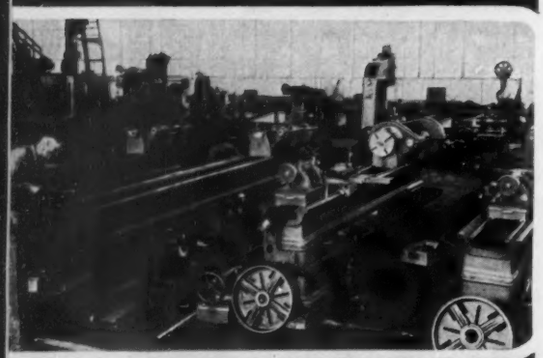

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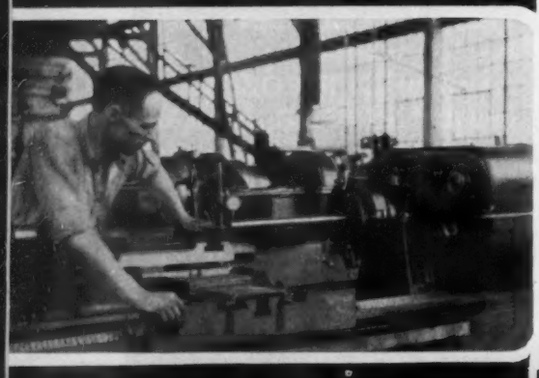

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THE MOTCH & MERRYWEATHER MACHINERY CO

PENTON BUILDING CLEVELAND, OHIO

Detroit Pittsburgh Cincinnati

there has been little test of the higher 2.55c, Pittsburgh, base.

Sheets

Sheet Prices, Page 380

Pittsburgh — In contrast to two weeks ago, sheet mill operations returned to about 80 per cent of capacity last week as no down-time for holidays was observed. Buyers continue to press for deliveries and in some cases are willing to pay the higher first-quarter market in return for preferential delivery through late January and early February. Hot-rolled sheets remain quoted on all new business at 2.15c, base, Pittsburgh, for 10 gage; 2.80c for 24 gage, and 3.40c on galvanized.

Cleveland—Mills report little new business at the increased prices, for most consumers have already specified well in advance. However, additional tonnage has been placed by those able to specify eight to ten weeks ahead, thereby obtaining preferred delivery positions on the mills rolling schedules. Automotive industry continues to be the leading consumer here, with close to 85 per cent of present supply going for that purpose.

Chicago—Sheet shipments to the automotive industry have been curtailed somewhat by labor trouble at glass and body plants and the outlook for heavier motor car assemblies is uncertain. Deliveries elsewhere are well sustained and with mills practically sold out for first quarter, production is being pushed. Only limited tonnages can be accepted for delivery before April 1. The higher prices prevail on new business.

New York—Sheet orders continue to aggregate a good tonnage, although not comparable with that of the early part of last month when consumers were rushing to cover before the $4 price advance became generally effective. With the elimination of the freight surcharge, the delivered price on all grades is off 2 cents per 100 pounds, effective Jan. 1.

Cincinnati — All classes of sheet consumers are specifying well into first quarter so that most of the output is engaged. Some interests believe that January needs will be accommodated but fear a delivery pinch in February during the usual spurt in automobile assemblies. Mill curtailments because of the holidays were held to a minimum. With freight surcharges removed, prices, del. Cincinnati, are: No. 10 hot-rolled, 2.415c; No. 24 hot-rolled, 3.065c; No. 24 galvanized, 3.665c; No. 10 cold-rolled, 3.065c; No. 20 cold-rolled, 3.515c; tin mill black, 3.215c.

Philadelphia—Sheet buying is definitely less active, with consumers taking a breathing spell, especially those who recently bought heavily to obtain position on mill books and now see a possibility of considerable tonnage being released by increasing labor trouble in the automotive industry.

St. Louis—The holidays have had little effect upon sheet production, new orders and shipments holding at the relatively high levels of recent weeks. Impending higher prices, which are thought will inevitably follow the recent rise in scrap and pig iron quotations, coupled with continued heavy consumption, constitute the chief bull incentive.

Birmingham, Ala.—Mills resumed sheet production at a high rate after a short holiday lull, with unusually large backlogs. Shipments are heavy in the effort to meet needs of consumers.

Strip

Strip Prices, Page 381

Pittsburgh—Effective Jan. 15, the three carbon classifications of cold-rolled strip steel will be advanced $5 a ton at Cleveland. Pittsburgh, and Worcester, Mass. At that time .051 to .075 carbon becomes 3.95c, Pittsburgh or Cleveland, and 4.15c, Worcester; with .076 to 1.00 carbon, 5.70c, Pittsburgh or Cleveland, and 5.90c, Worcester, Mass. Over 1.00 carbon becomes 7.75c, Pittsburgh or Cleveland, and 7.95c, Worcester. As of Jan. 1, the market on .026 to .050 carbon cold-rolled strip incorporates the $5 a ton increase to 2.85c, Pittsburgh or Cleveland, and 3.05c, Worcester, Mass. Hot-rolled strip steel for 1 to 25-ton lots will be named at 2.15c, Pittsburgh. Producers last week continued to accept heavy specifications against old fourth-quarter prices, but were generally firm in setting a Dec. 31 deadline on such business.

Cleveland—Little activity in demand for strip has been noted the past week, most buyers having already specified well ahead. In most cases mills are unable to promise definite delivery date and on some particular grades it will be close to the end of the quarter before mills will be able to make deliveries on orders recently placed at the higher prices.

Chicago—Heavy backlogs are supporting near-capacity operations, and mills expect to run full this quarter. New business is for delivery in February and March, with mills sold out for January. While automotive shipments have been well maintained, the labor situation is causing some concern.

Wire

Wire Prices, Page 381

Pittsburgh—Seeking to complete shipments against contracts placed

WELDIT Gasaver

AUTOMATICALLY SHUTS OFF FLAME BETWEEN WELDS

...Saving 25 to 30% in Gas and Oxygen

Torch Ignited. Flame Shut Off.

America's largest production plants use Weldit Gasavers. Cuts cost, eliminates idle torch flame hazards, increases production. Price $10.00. Two weeks trial. Send for circular.

WELDIT ACETYLENE CO. 642 BAGLEY AVE. DETROIT, MICH.

TEST THIS WELDIT GASAVER FREE FOR TWO WEEKS IN YOUR PLANT

before Dec. 1, wire producers are turning down business which cannot be shipped in January. There have been cases where wire buyers in turn have resorted to paying the higher market of $2.25 on nails in order to assure deliveries. This type of business has been so prevalent that sellers are conceding the Dec. 1 advance to be the quickest and most successful in many years as far as application date is concerned. Plain manufacturing wire continues to be quoted at 2.60c, and spring wire at 3.20c, Pittsburgh.

Chicago—Specifications for manufacturers' wire continue heavy, while the movement of merchant wire products to distributors' stocks is relatively brisk. The improved outlook for farm buying of fencing, barbed wire, etc., is contributing to better shipments of such products. While automotive demand for manufacturers' wire continues heavy, the outlook for sustained consumption is clouded by the labor situation in many parts of the country. Prices of wire and wire products are steady.

Quality Cokes ★ Tin Plates *of Character*

Annual Capacity 600,000 Base Boxes

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Main Office and Works: WASHINGTON, PENNA.

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Transportation

Track Material Prices, Page 381

For the most part railway buying is on a small scale after the heavy rail and car awards of the past few weeks. Norfolk & Western is the only large buyer of the past week, with 1000 hoppers. A report, which has not been confirmed, is to the effect the Baltimore & Ohio has postponed indefinitely action on 1500 coal cars on which it took bids Dec. 24.

Phillips Petroleum Co. will inquire shortly for 100 additional tank cars to be built by fusion welding process for experimental purposes, in addition to 25 now being erected in shops of various builders.

What is said to be the first recorded sale of steel rails from Japan to South America is reported to the department of commerce from Rio de Janeiro, Brazil. The Nazareth railway in the state of Bahia, Brazil, has bought 5187 metric tons of rails and 65 switches, costing $276,150 delivered. Sale was made by Mitsui & Co. Ltd., and Mitsubishi, Japanese firms. Delivery is to be in four months.

Car Orders Placed

Bangor & Aroostook, five coaches and two baggage and mail cars to Pullman-Standard Car Mfg. Co., Chicago.

Chesapeake & Ohio, 50 cabooses to Magor Car Co., New York; 50 stock cars to Greenville Car Co., Greenville, Pa.

Norfolk & Western, 1000 fifty-five ton hoppers, to Virginia Bridge & Iron Co., Roanoke, Va.; 100 steel box cars, to Greenville Steel Car Co., Greenville, Pa.

Car Orders Pending

Louisville & Nashville, 3000 box and other freight cars; bids soon.

Locomotives Placed

Western Pacific, seven 2-6-6-4 locomotives to American Locomotive Co.; four type 2-8-8-2 to Baldwin Locomotive works, Philadelphia.

Pipe

Pipe Prices, Page 381

Chicago — Cast pipe sellers fear that the anticipated pick-up in private purchases by municipalities this year will be more than offset by the decline in federal spending and that 1937 pipe sales will do well to equal the 1936 total. Demand is light, consisting of a few scattered lots.

Cleveland—Pipe jobbers are showing considerable activity in spite of restrictive seasonal influences. Little forward buying has been reported,

because prices on tubular goods have been extended unchanged into first quarter. Cast iron pipe producers report little activity the last few weeks and anticipate a further decline over the next few months.

New York—Cast pipe buying led by 500 tons for Trenton, N. J., is generally in small lots. Several thousand tons are likely to be placed early this month, including 430 tons by a contractor for Port Byron, N. Y. Eastern foundries are operating close to 75 per cent of capacity. Prices are steady.

Seattle—Prospects are improved for better tonnages in 1937 than during the last year. Under present conditions deliveries are uncertain and new projects are being postponed.

Cast Pipe Placed

500 tons, Trenton, N. J., to United States Pipe & Foundry Co., Burlington, N. J., through A. Stanley Mundy.
103 tons, 3 to 8-inch metropolitan water district, Los Angeles, to unnamed interest.

Cast Pipe Pending

360 tons, Chicago sanitary district.
300 tons, Lake Burien, Wash., system project; Pacific Water Works Supply Co., Seattle, low.
275 tons, 6 and 8-inch, alternate steel, Maplewood, Oreg.; bids Jan. 13.
128 tons, 6-inch Class 150, East Bay Municipal Utility District, Oakland, Calif.; bids opened.

Bolts, Nuts, Rivets

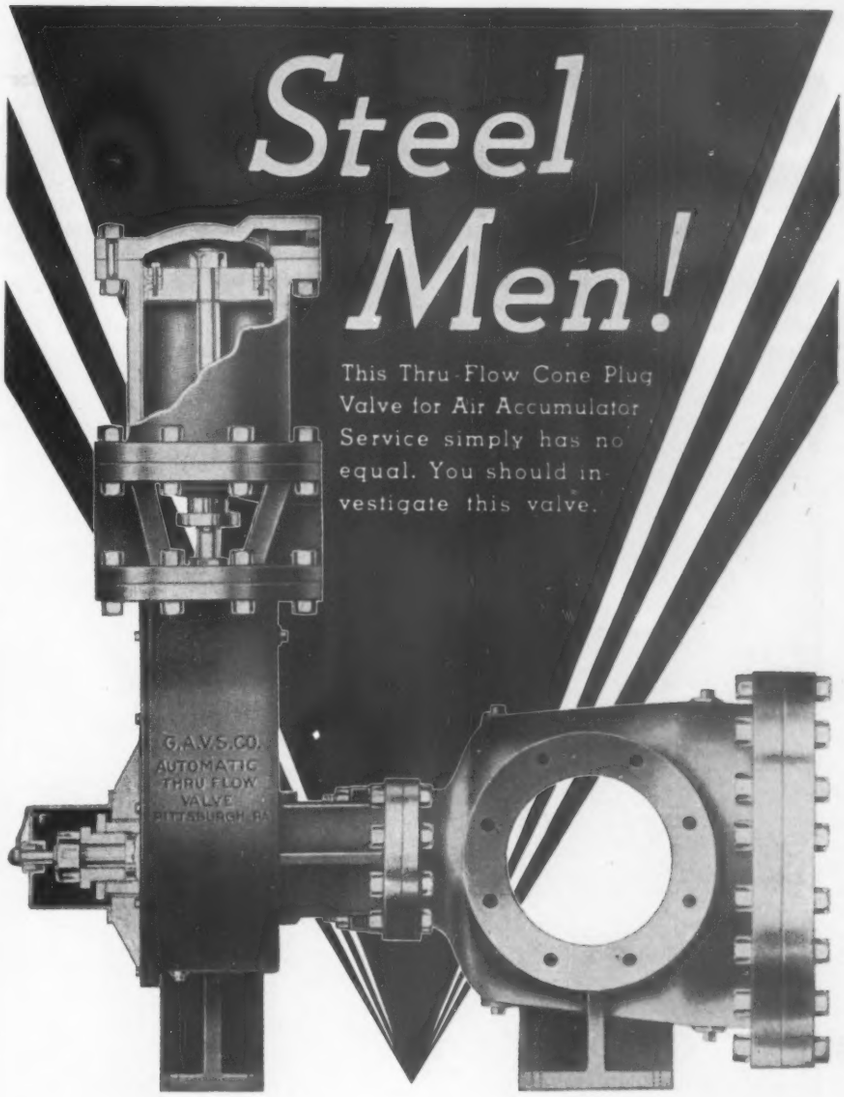
Bolt, Nut, Rivet Prices, Page 381

Bolt, nut and rivet producers have fairly heavy backlogs as a result of active buying during December. To a large extent the increase was occasioned by the higher prices effective on first quarter contracts, though consumption also is gaining among several important users. First quarter contracting largely is completed, and while prices are not rigidly held, there is a tendency toward a more stable market.

Semifinished

Semifinished Prices, Page 381

With producers now definitely out of the market for specifications at the old $32, Pittsburgh, base on rerolling billets, sheet bars and slabs, the higher price of $34 for first quarter has become operative since Jan. 1. At the same time forging quality billets now incorporate their $1 a ton advance and are quoted at $40, base, Pittsburgh. Having been subjected to some test, wire rods are firm at $43 and $45.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This Thru-Flow Cone Plug Valve for Air Accumulator Service simply has no equal. You should investigate this valve.
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AUTOMATIC THRU FLOW VALVE

• It took over 30 years to build a valve like this, but it won't take over 30 seconds to show you it is better.

Operation is positive—drop tight opened or closed. The full flow plug is stronger than pipe of the same area, and each unit—plug, valve body, operating head, and automatic control—is so designed that it may be individually serviced or removed without disturbing the other units.

Read the following five reasons why it "always does a better job"—and then send for your catalog.

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2. NO PACKINGS INSIDE VALVE but only round-port cone-plug, stronger than pipe line itself.
3. NEVER ANY FRICTION WEAR as cone-plug axially unseats before rotating to open or closed position.
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PITTSBURGH, PA.

Let us Send Catalog . . . Write Today.

Shapes

Structural Shape Prices, Page 380

New York—Led by three apartment houses which involve 4300 tons awards of structural shapes, especially for private building, spurted upward to around 10,000 tons last week as the $3 mill advance went into effect. The peak in inquiries appeared to have been reached toward the latter part of the month. The largest tonnage booked in the eastern area involved 3250 tons for the Southern New England Telephone building, New Haven, Conn.

New business booked by the structural steel fabricating industry during November declined less than it did last year, according to American Institute of Steel Construction, New York. New business totaled 50.3 per cent of the 1928 to '31 average, and for the first 11 months of last year it averaged 55.5 per cent. Shipments in November declined from the high of previous months, but were larger in total volume than new orders booked.

Cleveland—Fabricators are active in getting out the many small jobs placed through December. Some report enough work on books to keep them busy well into February. The usual seasonal decline was much less than expected and certainly less severe than in other years. The $3 a ton advance undoubtedly had much to do with the reversal in the seasonal trend. American Bridge Co., New York, was awarded 800 tons for Cleveland Twist Drill Co.'s building, Cleveland, through Sam W. Emerson Co., Cleveland.

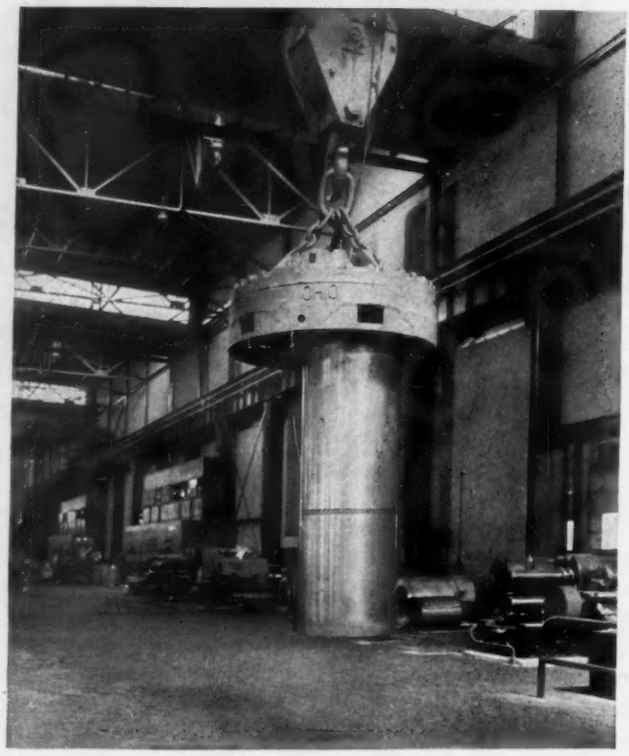
Chicago—With inquiries for small structural projects continuing numerous, a large tonnage of shapes is pending. Fabricators must close by the end of this month on material for which price protection has been extended, and an increase in awards is in prospect. The largest of recent awards is 1300 tons for a field house at Purdue university.

Pittsburgh—American Bridge Co. has closed on two important contracts; one being 2350 tons for Section 7 of the Sixth avenue subway in New York and 1750 tons for the Williamsburg Power Plant Corp.'s plant extension at Brooklyn, N. Y. Among inquiries are 1000 tons for a Cincinnati Gas & Electric Co. power station at Columbia Park, O., and 1100 tons for a municipal bridge at Corning, N. Y. Although identified building projects are being protected at 1.90c, base, Pittsburgh, for plain structural shapes through the balance of January, the open market is now quotable at 2.05c, Pittsburgh.

Buffalo—Good demand for building construction is indicated for the early part of the year. Many good sized projects are about to reach contract stage and a number of others soon will be closed. The last quarter of this year was exceptionally good for the season in comparison with operations of other years since 1931.

Philadelphia—In spite of the holiday season a fair structural tonnage has been placed. Du Pont interests, Wilmington, Del., placed

OHIO



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OHIO LIFTING MAGNETS—Of improved design giving Maximum All Day Lifting Capacity.

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OHIO MAGNET CONTROLLERS—With Automatic Quick Drop to speed up operation and With Ohio Arc Suppressor to reduce the arc and make the Contacts and Arc Shields last much longer.

Ask for new Bulletin No. 109

THE OHIO ELECTRIC MFG. CO.

5906 Maurice Avenue Cleveland, Ohio

Shape Awards Compared

	Tons
Week ended Jan. 2	33,736
Week ended Dec. 25	27,620
Week ended Dec. 18	13,667
This week, 1936	20,075
Weekly average, 1936	21,764
Weekly average, 1937	33,736
Weekly average, December	21,351
Total to date, 1936	20,075
Total to date, 1937	33,736

2000 tons for a plant addition at Richmond, Va., to Virginia Bridge & Iron Works, Roanoke, Va. The new delivered price on structural shapes is 2.255c, Philadelphia, this being predicated on a 2.15c, Bethlehem, Pa., base, and a reduction of 1c per 100 pounds in the freight rate due to the elimination of the surcharge Jan. 1.

Birmingham, Ala.—Structural steel fabricating shops are well supplied with business, specifications from contractors on tonnages placed some weeks before now being awaited. Specifications are under preparation for Tennessee Coal, Iron, & Railroad Co., development program now started.

Shape Contracts Placed

3250 tons, building, Southern New England Telephone Co., New Haven, Conn., to Bethlehem Fabricators Inc., Bethlehem, Pa., through Dwight Building Corp.

2350 tons, Section 7, Route 101 Sixth avenue subway, from West Eighteenth to West Twenty-seventh streets, New York, to American Bridge Co., Pittsburgh.

2260 tons, airport hangar, Newark, N. J., for United States treasury department, to Belmont Iron Works, Philadelphia.

2025 tons, plant No. 2, E. I. du Pont de Nemours & Co., Richmond, Va., to Virginia Bridge & Iron Works, Roanoke, Va.

1500 tons, apartment, West End Avenue and Eighty-seventh street, New York, for Sari Corp., to Harris Structural Steel Co., New York.

1500 tons, apartment, 111-117 West Ninety-sixth street, New York, to Harris Structural Steel Co., New York.

1375 tons, extension, Williamsburg Power Plant extension, Brooklyn, N. Y., to American Bridge Co., Pittsburgh, through Post & McCord Inc., New York.

1300 tons, 19-story apartment, 5-11 West Eighty-sixth street, New York to Harris Structural Steel Co., New York.

1300 tons, field house, Purdue university, Lafayette, Ind., to American Bridge Co., Pittsburgh.

1240 tons, New York Central railroad grade crossing elimination, Little Falls, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through Bates & Rodgers.

910 tons, McGregor bridge, Manchester, N. H., to American Bridge Co., Pittsburgh.

860 tons, bridge No. 611, Minot, N. Dak., to Minneapolis-Moline Power Implement Co., Minneapolis.

800 tons, building, Cleveland Twist Drill Co., Cleveland, to American Bridge Co., New York, through Sam W. Emerson Co., Cleveland.

775 tons, state highway viaduct, routes 214 and 75, Karns, Pa., to Bethlehem Steel Corp., Bethlehem, Pa.

680 tons, building, L. A. Young Spring & Wire Co., Trenton, N. J., to Bethlehem Fabricators Inc., Bethlehem, Pa.

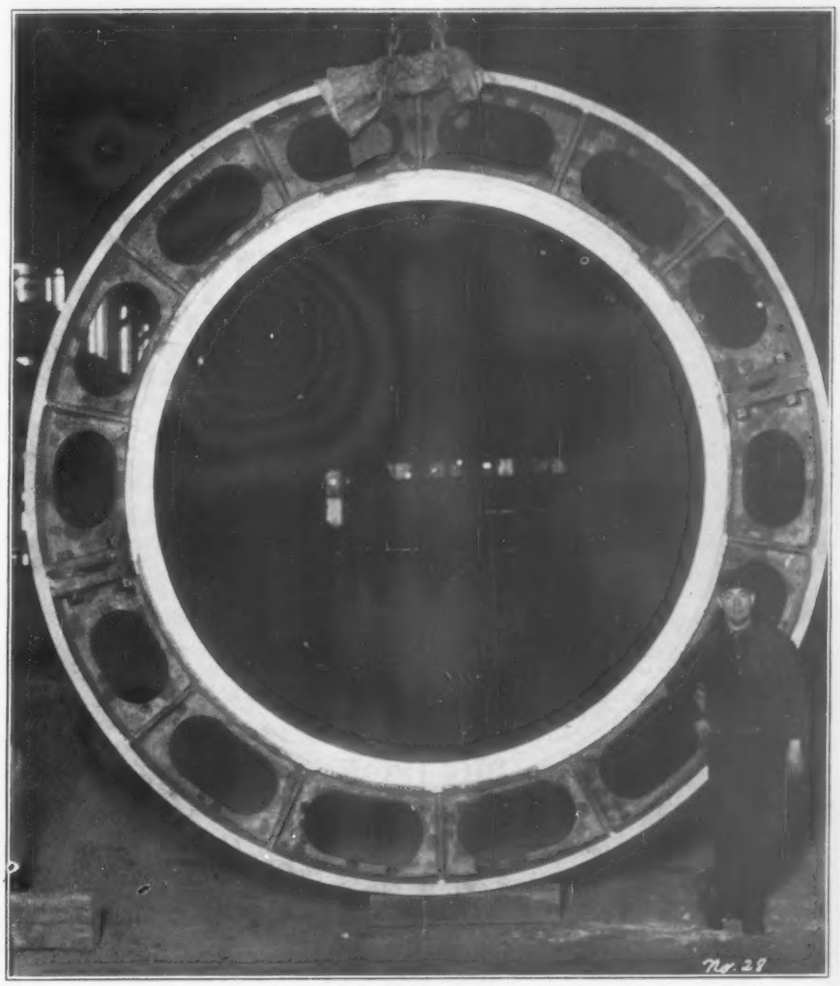
670 tons, Red Wing dam No. 3, Mississippi river, Minnesota, to Lakeside Bridge & Steel Co., Milwaukee.

610 tons, factory building, for Holly Sugar Co., Hardn, Mont., to Vierling Steel Works, Chicago.

605 tons, women's pavilion, 4810 Tenth avenue, Brooklyn, N. Y., to Ingalls Iron Works, Birmingham, Ala.

600 tons, Blue Ridge Parkway bridge, North Carolina, for United States department of agriculture, to Bethlehem

Reliance
STEEL CASTINGS



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● From the north, from the south, from the west and far over east—there are users of steel castings, that when assurance of soundness is essential, will order only from Reliance. Distance is no barrier when homogeneous Steel Castings are required. It is cheaper, and more satisfactory, to ship a few hundred extra miles to gain the assurance of clean, solid steel castings.

No matter where your plant is located, try out Reliance on your next order when none but the highest quality steel castings will do.

ESTABLISHED 1898

RELIANCE STEEL CASTING CO.
28th & Smallman Sts. PITTSBURGH, PA.

Steel Corp., Bethlehem, Pa.
600 tons, building for Owens-Illinois Glass Co., Los Angeles, to Ingalls Iron Works, Birmingham, Ala.
505 tons, Bijou street bridge, Colorado Springs, Colo., to American Bridge Co., Pittsburgh.
500 tons, building, Arizona, Phelps Dodge Corp., to Kansas City Structural Steel Co., Kansas City, Mo.
450 tons, state highway bridge, Route 192, Mill Creek, Pa., to American Bridge Co., Pittsburgh.
435 tons, bridge, Melbury, O., to Duffin Iron Co., Chicago.
400 tons, Transit road grade crossing elimination, Depew, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through Foley Bros. Inc., New York.
390 tons, post office building, for United States government, Aberdeen, S. D. to Bethlehem Steel Corp., Bethlehem, Pa.
375 tons, store, Abraham & Straus, Brooklyn, N. Y., to Jos. T. Ryerson & Son Inc., Chicago.
370 tons, bridge over Big Shark river, Belmar, N. J., for New York & Long Branch railroad, to Phoenix Bridge Co., Philadelphia.
350 tons, asphalt plant, city of New York, to Lehigh Structural Steel Co., through Woodcrest Construction Co., New York.
322 tons, including 47 tons piling, Parker bridge, Yuma county, Arizona, to Pittsburgh-Des Moines Steel Co., Pittsburgh.
305 tons, mill buildings, Paul Wight & Co., Greenwood, S. C., to Virginia Bridge & Iron Works, Roanoke, Va.
285 tons, addition to building, Rockford, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.
275 tons, building, for Wallace & Tierman Inc., Belleview, N. J., to Jos. T. Ryerson & Son Inc., Chicago.
260 tons, furnace steel Hughes-Foulkrod Co., Streator, Ill., to Pittsburgh Bridge & Iron Works, Rochester, Pa.
230 tons, cast iron tunnel rings, Queens-Midtown tube, for New York Tunnel authority, to U. S. Pipe & Foundry Co., Burlington, N. J.
230 tons, Sheridan drive crossing, Tonawanda, N. Y., for New York Central railroad, to Bethlehem Steel Corp., Bethlehem, Pa.
215 tons, bridge, FA 129 R 3 Denver, Colo., to Midwest Steel & Iron Works Co., Denver.
215 tons, state bridge, Malvern, Pa., to Bethlehem Steel Corp., Bethlehem, Pa., through McNichol Paving & Construction Co., Philadelphia.
213 tons, bridge near Flagstaff, Coconino county, Arizona, to unnamed interest.
210 tons, highway work near Denver, Adams county, Colorado, to unnamed interest.
200 tons, apartment, Bronx, N. Y., for Jos. Sager, to Mott Haven Iron Works, N. Y.
200 tons, state highway bridge, route 58001, Gaines Junction, Pa., to American Bridge Co., Pittsburgh.
200 tons, community building, Greenhills, Cincinnati, for United States treasury department, to William Lang & Sons Co., Cincinnati.
200 tons, senior high school, Lebanon, Pa., for board of education, to Bethlehem Steel Corp., Bethlehem, Pa.
185 tons, maintenance building, for Delaware Bridge commission, Camden, N. J., to Bethlehem Steel Corp., Bethlehem, Pa.
165 tons, building, Crown Cork & Seal Co., Philadelphia, to Lehigh Structural Steel Co., Allentown, Pa.
165 tons, factory, Stratton & Terstegge Co., Louisville, Ky., to Bedford Foundry & Machine Co., Bedford, Ind.
155 tons, highway bridge, Fulton-Douglas counties, Georgia, to Bethlehem Fabricators Inc., Bethlehem, Pa.
145 tons, building No. 61, U. S. Industrial Alcohol Co., Baltimore, Md., to Maryland Steel Products Co., Baltimore.
145 tons, Pennsylvania railroad bridge, Woodbridge, N. J., to Bethlehem Steel Co., Bethlehem, Pa., through Wilson & English Inc., New York.
125 tons, housing projects, Washington, to Roslyn Steel & Cement Co.
121 tons, two bridges, Crook and Sheridah county, Wyoming, to unnamed interests.
115 tons, Ewing bridge, East Jamaica, Vt., to Vermont Structural Steel Corp., Burlington, Vt.
100 tons, building, Greenpoint Savings Bank, Brooklyn, N. Y., to Weatherly Steel Co., Weatherly, Pa.

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IRON ORES

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BRANCH OFFICES
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Shape Contracts Pending

3200 tons, sheet piling, for East river bulkhead from Grand to Twelfth street, New York, New York City dock department will have plans out the end of January.
1500 tons, New York city structure No. 5, elevated highway from 121 to 124th streets; bids due Jan. 5.
1400 tons, cranes, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
1250 tons, oil derrick, Houston, Tex.
1200 tons, warehouse, New Orleans.
1100 tons, municipal bridge over Chemung river, Corning, N. Y.
1000 tons, Columbia power station-unit No. 3, Columbia Park, O., for Cincinnati Gas & Electric Co., Cincinnati.
960 tons, bridge, for Louisiana & Arkan-

sas railroad, Simmesport, La.; bids Jan. 14.
150 tons, beam and deck plate girder spans, various locations, for Missouri Pacific railroad.
870 tons, bridge, Everett, Pa.; bids Jan. 8.
800 tons, bridge, Orford, N. H.; Hagan-Thibodeau Construction Co., Wolfsboro, N. H., low.
800 tons, 12-story apartment, on Ninety-fourth street, New York; bids asked.
600 tons, shafts 17 to 23, Contract 336, for city of New York, Westchester county, New York.
500 tons, six turntables, various locations, for Chicago, Milwaukee, St. Paul & Pacific railroad, Chicago.
500 tons, public school 104, on Mott avenue, Queens, N. Y.; bids Jan. 5.
500 tons, public school 108, on Neill avenue, Bronx, N. Y.; bids Jan. 5.
450 tons, bridges over Santa Clara river, California, for Southern Pacific Co., San Francisco.
400 tons, high school building, for board of education, Stevens Point, Wis.
400 tons, alterations to store building, for Fifth Avenue Realty Corp., New York.
400 tons, Washburn Wire building, New York.
400 tons, alterations to theater, Sixth avenue at Fourteenth street, New York; out for figuring.
400 tons, 8-story apartment, Pinehurst avenue & 187th street, New York.
400 tons, 8-story apartment, Sheridan street and Mounteden avenue, Bronx, N. Y.
350 tons, West Thirty-eighth avenue underpass, Denver, Colo.
350 tons, bridge, Springfield, Mass.; Coleman Bros. Corp., Boston, low.
340 tons, Washington state bridge project, Pacific county (including machinery); bids rejected, to be readvertised.
300 tons, bridges over Tehachapi creek, California, for Southern Pacific Co., San Francisco.
300 tons, postoffice, Poughkeepsie, N. Y.; bids asked.
260 tons, extension to motor coach garage, for Eastern Massachusetts Street Railway Co., Lynn, Mass.
260 tons, plate shop, Harrison, N. J., for Worthington Pump & Machinery Co.
250 tons, coast guard station, New York; Grave Quinn Corp., New York, low.
245 tons, bridge, Lockhaven, Pa.; bids Jan. 8.
230 tons, bridge, Entricken, Pa.; bids Jan. 8.
225 tons, Washington state bridge project; bids at Olympia Jan. 12.
200 tons, theatre and commercial building for Northern Amusement Corp., Chicago.
200 tons, shafts 2, 2A and 3, Contract 332, for city of New York, Ulster county, New York.
200 tons, structural shapes, 312 tons, sheet piling; and 1050 tons of supporting steel for Delaware aqueduct shafts various New York locations, for board of water supply, New York City; bids Jan. 12.
200 tons, grade crossing elimination over Lehigh Valley railroad tracks, Depew, N. Y.
200 tons, Christian Science Church, on Seventy-seventh street, New York; bids asked.
185 tons, warehouse Twenty-first and twenty second streets, New York; bids asked.
140 tons, bridge over Willimantic river, Hartford, Conn.; bids asked.
118 tons, post office, St. Albans, Vt.; Smith Construction Co. Inc., Derby, Conn., low.
105 tons, frames for Bonneville project fishway; King Bros., Portland, low.
Unstated, control equipment for bridge and locks, Bonneville project; bids to U. S. Engineer, Portland, Jan. 19.
Unstated tonnage, service station, New

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York Edison Co. on Ninety-sixth street, New York.

Unstated tonnage, steel truss bridge at Erving-Montague; steel stringer bridge at Ludlow-Wilbraham; and steel stringer bridge at Sutton, Mass.

Reinforcing

Reinforcing Bar Prices, Page 381

Cleveland—Mills are active turning out tonnage requirement for many small jobs placed during December. Large projects have been scarce and outside of tonnage expected early next spring for the sewage disposal development, this city, the outlook for jobs requiring heavy tonnages is not encouraging. Prices remain firm at the advanced figures, but no real test has yet been offered.

Pittsburgh — Pennsylvania state highway department is advertising for bids by Jan. 8 on the following lots of plain steel bars: 41 tons for Bedford county, 25 tons for Clinton county, 28 tons for Huntingdon county, 19 tons for Jefferson county, and 12 tons for Cambria county. On all specific building projects not signified before Dec. 23 for a closing date in January, the higher market of 2.25c for new billet quality bars is now quoted.

New York—The concrete reinforcing bar market was quiet last week as the year ended, with activity limited to jobs involving less than 100 tons each, and no test of the new price of 2.60c f.o.b. cars New York reported. Effect of the recent $3 markup at the mills and $4 by jobbers has not been gaged definitely in a market weak pricewise. Public school foundation work in New York will require an undetermined tonnage of reinforcing material.

Philadelphia—The new reinforcing bar price of 2.49c has been subject to little test to date. Recent awards which have come in for protection as they involved identified projects include: 135 tons for state road work in Chester county, Pennsylvania, placed with American Steel Engineering Co., Philadelphia.

Chicago—A fairly large tonnage of reinforcing bars is pending, the largest items being 1375 tons for the Southwest sewage treatment works, Chicago. Inquiries for small lots are relatively numerous for this period. Shipments against contracts are well maintained and mills have moderate backlogs which will support schedules during January.

Seattle—For the first time in several years local mills are operating through the holiday season, backlogs being still of considerable size. Mill price remains at 2.45c but an increase is expected to be effective almost any day, jobbing prices already having been advanced 3.00c.

Reinforcing Steel Awards

200 tons, New York City asphalt plant, to Igoe Bros. Inc., Newark, N. J.

135 tons, state road work, Chester county, Pennsylvania, to American Steel Engineering Co., Philadelphia.

130 tons, warehouse, for Atlantic Refining Co., Philadelphia, to Bethlehem Steel Corp., Bethlehem, Pa.

Reinforcing Steel Pending

1375 tons, Southwest sewage treatment

Concrete Awards Compared

	Tons
Week ended Jan. 2	465
Week ended Dec. 25	6,795
Week ended Dec. 18	2,810
This week, 1936	2,440
Weekly average, 1936	6,005
Weekly average, 1937	465
Weekly average, December	3,560
Total to date, 1936	2,440
Total to date, 1937	465

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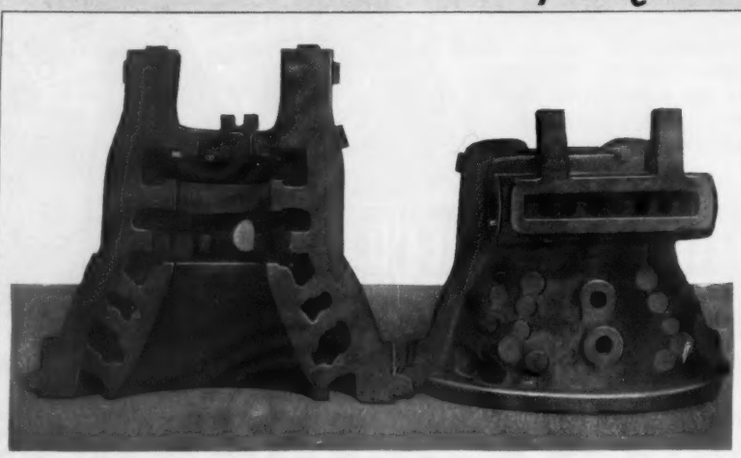

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works, Chicago sanitary district.
180 tons, Washington state spans, Grays Harbor county; Olympic Pile Driving Co., Port Townsend, Wash., general contractor.
175 tons, coast guard station, New York; Grave Quinn Corp., New York, low.
160 tons, Transit road grade crossing elimination, Depew, N. Y.; Foley Bros. Inc., New York, general contractor.
153 tons, two Washington state road projects; bids at Olympia, Wash., Jan. 12.

Pig Iron

Pig Iron Prices, Page 382

Pittsburgh—Pig iron buyers had until Jan. 1 to enter specifications against the 50-cent per ton higher price. Bookings were so heavy in this buying movement that furnaces catering to the merchant trade find themselves booked up well into the first quarter. Wheeling Mold & Foundry Co. resumed operations last week after an idleness of more than six months.

Chicago—Local producers have followed the lead of eastern interests in advancing prices 50 cents a ton, effective Dec. 30. Since elimination of the freight surcharge coincides with the price advance, delivered prices to outlying points are increased less than 50 cents. Buying has been stimulated and producers now are faced with heavy shipments throughout first quarter.

Cleveland—The general conclusion that all other points will follow the Pittsburgh base advance of 50 cents a ton, has caused many consumers to come into the market for additional tonnage. Producers at present are shipping more than they are producing. Some believe that December will be the biggest month this past year, culminating the sixth consecutive month in which an increase was reported.

Buffalo—It is estimated that 1936 sales and shipments of pig iron have been 20 per cent greater than those of 1935. December was an excellent month and liberal releases are indicated for the early part of January. All of the 12 furnaces now producing will run well into this year. Buying for the first quarter continues.

New York—A further advance of 50 cents a ton, Jan. 1, stimulated activity in the closing days of last month and with leading consumers now virtually covered for the first quarter, new business is expected to be dull for some time.

Japan is reported to have inquiry out for 100,000 tons of pig iron, mostly foundry grades, in addition to the 40,000 tons it recently placed in this country.

Philadelphia—In view of the further protective buying in the closing days of last month, prior to the new increase of 50 cents a ton Jan. 1, producers expect a lull in business for the next few weeks.

St. Louis—Price of pig iron was advanced 50 cents per ton Jan. 1 on both the northern and southern product. This was not unexpected, due to the sharp upturn in scrap prices and continued contraseasonal heavy consumption of both basic and foundry iron.

Cincinnati—Effective Jan. 1 prices of both northern and southern pig iron were advanced 50 cents. Some business was done before the announcement, at $1 increase over fourth quarter quotations, so that melters are now covered for the first quarter. Northern iron with freight surcharge removed is: No. 2 foundry, base Hamilton, $21; malleable, $21; basic, $20.50. Southern iron, delivered Cincinnati, is: No. 2 foundry, $20.19; basic, $19.19.

Birmingham, Ala.—Even with a second advance in the base price, the pig iron market continues strong. Shipments have resumed activity and will continue steady for some time to come.

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Scrap

Scrap Prices, Page 384

Pittsburgh — The usual holiday quiet dominated the market on re-melting scrap last week, but quotations held firmly at $19.25 to $19.75 on No. 1 steel. Interest centers on railroad scrap lists closing this week, the Baltimore & Ohio Jan. 4 and the Pennsylvania, Jan. 6. The leading item on the latter list is 12,000 tons of No. 1 heavy melting steel. Forecasts are being given freely that a price of better than $20, delivered, Pittsburgh district, will be the successful bid on the Pennsylvania tonnage, and most brokers agree that the market is headed toward higher levels through January. Brokers are now paying 25 cents a ton more for machine shop turnings for shipment to this district, with the consuming market quoted $14 to $14.50.

Philadelphia—An easier situation exists in steel and iron scrap, reflecting in a measure labor disturbances in the automotive industry which have caused some mid-western consumers to withdraw from the market. Another recent factor was the disposition of consumers in the final days of December to hold off until the freight surcharge was eliminated, Jan. 1. However, January business should profit by the latter delay. Fundamentally the market still is strong with higher prices noted in several grades. Italy, after several months absence from the market, again is an active buyer.

New York—Advances of 50 cents to $1.50 a ton on the more active grades of iron and steel scrap features brokers' buying prices. Demand is brisk with most eastern steel mills taking shipments. Early inquiry for approximately 50,000 tons of No. 1 machinery cast is expected from a Catasauqua, Pa., foundry which has the contract for linings, Midtown tunnel, New York. To most consuming points from this district elimination of the 7 per cent freight surcharge reduces such rates 25 to 40 cents a ton. Export demand has improved with both grades of steel scrap up $1 a ton, while No. 1 heavy melting steel for domestic shipment has also advanced a similar amount.

Boston—Scrap is moving briskly with important consumers considering re-entering the market. A reliable report is that No. 1 heavy steel is being exported at $14 to $15, f.a.s.

Buffalo—An active scrap market has been created here, partly by high offers from other districts, and partly by intensive efforts of dealers to get material to ship on contracts. One dealer is bidding against another as rapidly as scrap is offered and this is creating one of the strongest markets this district has known in recent years.

The heavy melting steel situation is somewhat uncertain. Dealers freely offer $15.50 for No. 2 steel, leading to the belief that sales have been made at $16 or better. Some reports, unconfirmed as yet, are that this grade has brought up to $16.50 for first quarter shipment and that No. 1 steel could be sold in tonnage at $17.50.

Cleveland — Recent advances in iron and steel scrap here are bringing out somewhat more liberal supplies, and quotations have firmed in the valleys. Shipments to consumers continue fair. New buying, as always at the year-end, has slackened.

Detroit—Monthly automotive lists which were closed early last week found basis for further advances in No. 1 and No. 2 melting steel, low phos plate scrap, hydraulic compressed and loose sheet clippings. No. 1 steel is now quoted $15 to

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$15.50, 50 cents higher, and hydraulic compressed sheets at $15.50 to $16 represent a similar advance.

Chicago — Scrap is stronger in dealer and broker transactions, but consumers' prices generally are unchanged. Sellers are paying from $18 upward for heavy melting steel, and an advance is anticipated on subsequent purchases. This market nominally is unchanged at $17.50 to $18, on the basis of last sales.

Cincinnati—The market on all grades of iron and steel scrap is strong. Prices were nominally unchanged in absence of a test as prices paid by dealers to acquire stocks varied widely. No important mill purchases were reported. Short rails, No. 1 machinery cast and railroad specialties topped the demand.

St. Louis—The market for iron and steel scrap has been affected by the holidays, purchasing by the industries having virtually vanished. However, what users lacked in buying activity was more than supplemented by dealers, who are still eagerly competing for material to deliver on contracts. Prices are at recent high levels, and in the case of all grades, leave the old year at the pinnacle of the recent upward migration.

Birmingham, Ala.—While some important scrap consumers are not in the market, particularly pipemakers, the market is firm and prices are steady. Scrap is scarce and most stockpiles are small.

Toronto, Ont.—Buying of iron and steel scrap is lessening although shipments against contract are going forward. Steel scrap is the most active and several good shipments were made during the week, but new orders are slow and local dealers state that consumers are not showing much interest. Demand for iron grades is spotty and sales are confined to small tonnages.

Warehouse

Warehouse Prices, Page 383

Pittsburgh — Effective on shipments after Jan. 1, hot-rolled bars, plates and shapes have been advanced $3 a ton, and $4 a ton increases have become effective on hot-rolled strip, hoops and bands, reinforcing bars, all sheet items, cold-finished bars and both hot and cold-rolled alloy steel. A $3 a ton increase is being made in steel sheet piling, but there will be no advance on boiler tubes.

Philadelphia—New prices went into effect here Jan. 1 on most products out of warehouse. Revision covered increases in mill prices and in most cases an additional charge for warehouse handling.

New York—Advances of $3 to $5 a ton are effective on most steel products out of warehouse. Numerous buyers anticipated the advance and the volume has been considerably in excess of the usual year end.

Cleveland—Warehouse distributors have increased prices to conform to mill advances, in effect Jan. 1, on most products. Sales have improved considerably the last two weeks, many consumers anticipating the price adjustments. However, December will not equal the total sales reported for November, although one jobber showed a slight increase.

Detroit — Jobbers advanced galvanized and black sheets by $4 a ton Jan. 1, but have delayed making an announcement on first-quarter prices of other finished steel products.

Chicago—Warehouses announced price advances Jan. 1, in amounts equal to the increases which become

effective on mill products this quarter. While December business showed a decrease from November, the reduction was less than that commonly experienced during the year-end.

St. Louis—Warehouse prices have been advanced to conform with the recent mill advances, Jan. 1. Sheets are in heavy demand from a broad variety of users, the activity being partly due to tardy mill deliveries.

Cincinnati — Warehouse demand resisted holiday influences so that December shipments were among the best of the year. The entire fourth quarter shows tonnage above any corresponding period since 1930. Prices were advanced Jan. 1, in line with previously announced mill increases.

Seattle—There is little immediate interest in the market, and dealers expect no buying movement for at least two weeks. Effective Jan. 1. reinforcing prices were advanced 25 cents to 3.75c for less than 4000 pound lots. Portland dealers have advanced merchant bars to 3.75c and are endeavoring to stabilize the situation by adopting the same price schedule effective in Seattle territory.

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Refractories

Refractories Prices, Page 382

Pittsburgh—The market on various grades of refractory brick becomes quotable at higher levels effective on shipments Jan. 1 and thereafter, except in the case of specific and identified building jobs, such as blast furnace and coke oven relinings, which will be protected for the first nine months of 1937, if blanket orders were placed before Jan. 1, 1937. The higher prices on refractories will begin also the allowance of 5 per cent discount to all types of users on all grades of fire clay and silica brick irrespective of classification.

Refractory brick sellers entered 1937 after the best year since 1930 and holding substantial backlogs to insure heavy production for some months. Extensive repairs to blast furnaces and coke ovens loom large, as does new coke oven construction. Outstanding cases of the latter include new construction for steel concerns at Youngstown, O., Cleveland, Detroit, and at Birmingham, Ala., among many other points.

Ferroalloys

Ferroalloy Prices, Page 382

New York — Elimination of the freight surcharge Jan. 1 is resulting in some specifications which might otherwise have fallen in the close of last month. Sellers here are now predicating their delivered Pittsburgh price on the basic freight rate of $4.79 from Baltimore to Pittsburgh, quoting $84.79 delivered at that point. Domestic spiegeleisen, 19 to 21 per cent, is holding at $26, Palmerton, Pa., on all quantities.

Metallurgical Coke

Coke Prices, Page 381

As of recent count, 3033 beehive coke ovens in the Western Pennsylvania district were active, with this number about to be increased from 10 to 25 per cent before Feb. 1. Prices on standard furnace coke still are representative at a $3.90, f.o.b. ovens, minimium, and on some sales for quick shipment premiums involving as high as $4.15 and $4.25 have been reported. The market on common foundry coke also holds firmly at around $4.50 to $4.75, f.o.b. ovens. Republic Steel Corp. has sold the Martin coal mine

near New Geneva, Pa., to the Sitneck fuel interests, Philadelphia.

Chicago producers have advanced prices 50 cents to $9.50 ovens, for outside delivery and $10.25, delivered, Chicago. December shipments were the heaviest for the year in that district. Cincinnati users continued to take heavy shipments through the holidays to build reserves.

Tin Plate

Tin Plate Prices, Page 380

Pittsburgh — Contrary to two weeks ago, tin mills in this district engaged a full 17 working turns and again had restored operations to close to the 100 per cent mark. Two weeks ago average operations were 10 out of 17 turns with holiday observance from Dec. 25-27. A survey shows hot tin mills with two to three weeks' backlogs and cold reducing mills with a month to six weeks' business ahead. The market is quoted unchanged on a net basis of $4.85 per base box, f.o.b. Pittsburgh.

Coke By-Products

Coke By-Product Prices, Page 381

New York—Distillate prices are steady and unchanged, demand for toluol and xylol holding brisk. Lacquer makers are taking good shipments and current output is being absorbed without supplies accumulating. Consumers of napthalene are covering for this half at 7.25c per pound to jobbers. Sulphate of ammonia and phenol are in steady demand, notably the latter at unchanged prices.

Nonferrous Metals

Nonferrous Metal Prices, Page 382

New York—Demand for nonferrous metals in the domestic market was quiet last week but prices were steady. Chief interest centered in developments abroad where liquidation of speculative holdings depressed the markets. Selling on the London Metal Exchange was well absorbed and caused no weakening of the price structure here.

Copper—Buying was light but all sellers quoted electrolytic firm at 11.62½c, Connecticut. Supplies were limited but sufficient to cover current inquiry. Export copper declined to around 11.80c, c.i.f. following an advance to 11.92½c earlier in the week.

Lead—Consumers entered the market fairly actively on Tuesday when prices in London advanced to the equivalent of 6.30c. The market subsequently eased and buying here tapered. Prices held at 5.85c, East St. Louis.

Zinc—Prime western held firm at 5.45c, East St. Louis, due to restricted supplies and comparatively high prices abroad. Fresh demand was light.

Tin—Siam has approved the new production control plan, assuring renewal of the scheme for a period of five years. Consumers remained out of the market and Straits spot prices eased to around 51.50c.

Antimony—Prices advanced to 13.75c, New York, on reports of higher levels in China. Buying was confined to occasional carlots.

Steel in Europe

Foreign Steel Prices, Page 383

London—(*By Cable*)—Shortage of pig iron and steel in Great Britain is becoming more acute and demand in Continental markets is curtailing tonnages exported to Britain. Producers here are booked months

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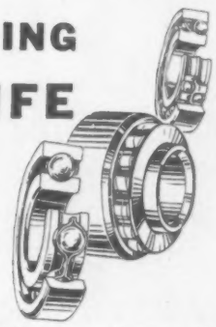

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ahead and production capacity is being increased. Heavy steel prices are being advanced 3s, effective Jan. 1.

The Continent reports active export trade in all markets with prices firm and business is being done at a premium.

Czechs May Use Apple Juice To Temper Steel

That apple juice may be used in place of oil in the tempering of steel in Czechoslovakia is indicated in a report to the commerce department from Acting Commercial Attache Jule B. Smith, Prague.

It is reported locally, Mr. Smith states, that the Technical University in Prague and the machinery concern, Skoda Works, of the same city, have made satisfactory tests with a new method which replaces oil by apple juice in the tempering of steel.

The apple juice preparation is called Kolodit by the Czechoslovak inventor. If his method proves of practical value, the report states, it may be of importance to the Czechoslovak iron and steel works as oil for steel tempering must be imported.

Brassert Firm To Build Steelworks in Turkey

Contract for the first iron and steel plant to be built in Turkey in Asia has been placed with H. A. Brassert & Co. Ltd., British branch of H. A. Brassert & Co., Chicago, according to the *London Times*.

To be constructed at Karabuk, about 125 miles northwest of Angora, Turkish capital, the plant will cost nearly $15,000,000, and is expected to have a yearly capacity of about 150,000 tons. The works will be operated for the Turkish government by the Sumer bank at Angora.

Accident Rate Up with Industrial Activity

Improved industrial activity in 1936 was accompanied by a rise in accidental deaths and injuries, according to the National Safety council. The council reports, however, that the rise probably was smaller than the gain in employment and man-hour exposure to accidents. The increase up to Nov. 1 was 5 per cent. The October total of occupational accidental deaths was 1500. The total for the first ten months of 1936 was estimated by the council at 14,500 compared with 16,500 for all of 1935.

Describes Development of High-Speed Cutting Tools

Uses of various metals as cutting tools were described by Dr. C. W Balke, Fansteel Metallurgical Corp North Chicago, Ill., before the annual meeting of the Superintendents' and Foremen's club, Chicago branch, National Metal Trades association, at Hotel Sherman, Chicago, recently. He discussed the history of high-speed steels and the development of carbides of tantalum, columbium and tungsten and their uses.

Officers were elected as follows: President, K. R. Wood, Union Special Machine Co.; vice president, Alex Trombley, Continental Can Co.; financial secretary, H. J. Coleman, Acme Steel Co.; recording secretary, E. J. Whelan, Foote Bros. Gear & Machine Co.; secretary, C. L. Blatchford; treasurer, Goodman Mfg. Co., all of Chicago.

TITAN BRASS AND BRONZE FORGINGS—BRASS AND BRONZE FORGINGS—BRASS AND BRONZE FORGINGS—BRAS

BRASS AND BRONZE FORGINGS—BRASS AND BRONZE TITAN BRASS AND BRONZE FORGINGS—BRASS AND BRONZE

BRASS AND BRONZE FORGINGS—BRASS AND BRONZE FORGINGS—BRASS AND BRONZE FORGINGS—BRAS TITAN

When Titan brass or bronze forgings are specified for those parts that *must* stand up under chemical corrosion and the fatiguing effects of shock loads, the manufacturer and user alike may depend upon their long useful life.

The proper selection of materials is an art acquired only after long years of experience and specialization. Titan has the background of brass specialization required to produce brass and bronze forgings of the quality to fit your most exacting needs.

The Titan mills, located at Bellefonte, Pennsylvania, are economically situated to serve the brass and bronze needs of the 40,000,000 people located within a radius of 300 miles—from Hartford in the East to Detroit, and from Rochester, New York, to Richmond, Virginia, Titan products have built up a long list of satisfied customers.

Dealing with Titan has a distinct advantage in the flexibility of service offered. Titan readily meets special requirements and special schedules.

Let Titan quote on your next order.

Titan Metal Manufacturing Company

Brass and Bronze Products

Bellefonte, Pennsylvania

District Steel Rates

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week week Jan. 2	Change	Same week 1936	Same week 1935
Pittsburgh ..	77	+10	38	25
Chicago	77	+13	47	47
Eastern Pa...	52	+ 4½	34	23½
Youngstown..	78	+10	62	53
Wheeling	92	+ 4	70	80
Cleveland ...	77	+ 9	72	77
Buffalo	84	+37	50	39
Birmingham..	74	None	56	27½
New England	75	— 2	75	68
Detroit	100	+ 8	88	59
St. Louis	80	None	†	†
Cincinnati ...	92	— 4	†	†
Average ...	79	+11	49½	42½

†Not reported.

Production

STEEL ingot production last week averaged 79 per cent, 11 points above the preceding week, but off slightly from the pre-holiday level of 79½ per cent.

New England — Off 2 points to 75 per cent, with a rate of 92 per cent scheduled for this week.

Central eastern seaboard — Rebounded from 47½ per cent to 52, with a further gain expected this week.

Youngstown — Averaged 78 per cent, up 10 points. Republic Steel Corp.'s bessemer furnace was down last week for repairs after a record two-year run, while Carnegie-Illinois Steel Corp. added a unit at its Ohio works, and Sharon Steel Corp. added one to its active list.

Cleveland-Lorain — Moved up 9 points to 77 per cent. Republic Steel Corp. operated 13 open hearths; Otis Steel Co., 7, and National Tube Co., Lorain, 10.

Chicago—Production increased as mills operated on New Year's day. The rate averaged 77 per cent, a gain of 13 points. Twenty-eight of 38 blast furnaces are active.

Cincinnati—Steelmaking curtailments because of the holidays were minimized by overtime operations. Production is rated 92 per cent, with 12 open hearths active.

Birmingham—Held at 74 per cent, with little time lost over the New Year holiday.

Buffalo—Snapped back to 84 per cent, a gain of 37 points, following resumption of operations after the Christmas shutdown. Thirty-one open hearths are melting.

Pittsburgh—Up 10 points to 77 per cent, figured on a full week's operations, and no down-time on New Year's day. United States Steel Corp. plants operated at 72 per cent.

Forty-five steelworks blast furnaces continue active, but one unit was changed from basic to spiegeleisen last week, this being "C" furnace at the Edgar Thomson works of Carnegie-Illinois.

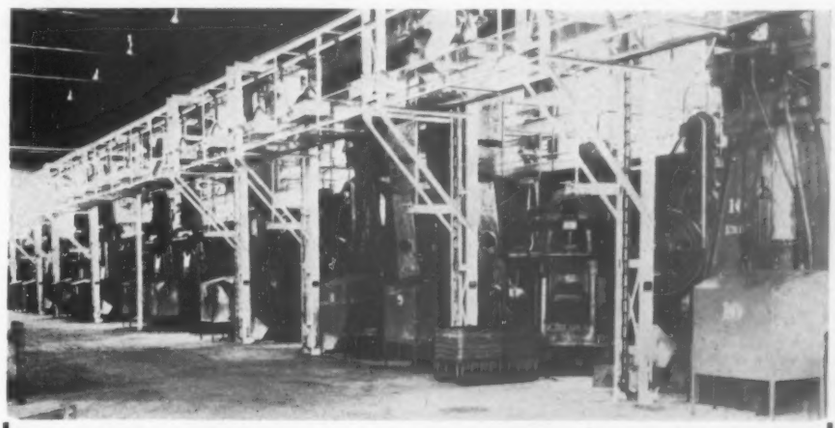
St. Louis—Unchanged at 80 per cent. Mills are operating on high schedules and will maintain the present rate for an indefinite period.

Wheeling—Up 4 points to 92 per cent, with 34 out of 37 open-hearth furnaces on active schedule.

Detroit—Up 8 points to 100 per cent, as all 21 open-hearth furnaces were making steel.

Scrap Committees To Hold Annual Meetings

Nine standing committees of the Institute of Scrap Iron & Steel Inc., will hold their annual meetings in connection with the institute's ninth annual convention at the Netherland Plaza hotel, Cincinnati, Jan. 14-16. They will adopt recommendations and resolutions to submit to the convention. The committee form of government in the institute is the result of an amendment to the by-laws adopted at the eighth annual convention.



Prepared For Prosperity

Twenty-six ERIE hammers and presses, installed in this shop during the past year, prepare the plant for the peak production predicted.

Have you enough *usable* equipment for the production you expect this year? Now is the time to buy, for prices are rising. Will your equipment stand the gaff of production under steady pressure? These ERIES are built for that, and for power economy, too.

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ERIE, PENNA., U. S. A.

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ERIE

Carnegie Employes Defend Collective Bargaining

Letters, telegrams, telephone calls and personal requests from employes in virtually all plants and mills of the Carnegie-Illinois Steel Corp. disclosed last week a desire of the majority of employe representatives and other workers to support their collective bargaining agency against attacks before the national labor relations board.

At Homestead the employes have written Secretary of Labor Perkins requesting a definition and interpretation of "collective bargaining" so "we will have some standard with which to compare" their results in dealing with management under their plan of employe representation.

Labor Trouble Again Lowers Auto Production

While steelworks operations last week regained practically all of the Christmas-week loss (see page 403), automobile production showed further decline, due to labor difficulties.

Output was estimated at 71,800, compared with 79,019 in the preceding week, and 121,038 in the third week of December. The losses were considerably larger than those which could be counted for by the holidays, on the basis of the daily average in November and December.

General Motors' order to some of its partsmakers last week to suspend shipment of parts temporarily up to Friday had not affected the movement of steel to any marked extent. Only a few shipments of pig iron to General Motors automobile foundries were held up.

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

	1934	1935	1936
Jan.	155,666	289,728	364,004
Feb.	230,256	332,231	287,606
Mar.	338,434	425,913	420,971
Apr.	352,975	452,936	502,775
May	330,455	361,107	460,565
June	306,477	356,340	452,955
July	264,933	332,109	440,999
Aug.	234,811	237,400	271,291
Sept.	170,007	87,540	135,130
Oct.	131,991	272,043	224,628
Nov.	83,482	395,059	394,890
Dec.	153,624	404,528	*460,000
Year	2,753,111	3,946,934	4,415,814

*Estimated.

Estimated by *Cram's Reports*

Week ended:

Dec. 5	100,395
Dec. 12	119,455
Dec. 19	121,038
Dec. 26	79,019
Jan. 2	71,800

Engineering Council Ready For Annual Assembly

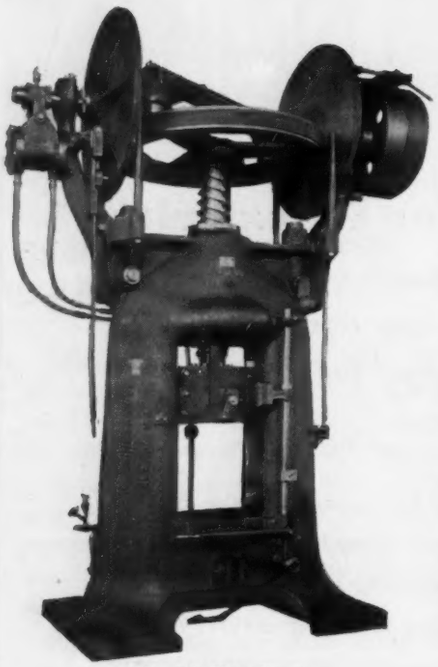
Problems dealing with public affairs, conservation of natural resources and engineering economics will be discussed at the seventeenth annual assembly of the American Engineering council at Hotel Mayflower, Washington, Jan. 14-16.

A public affairs symposium is scheduled for the evening of Jan. 14; a business session morning of Jan. 15; a public affairs session in the afternoon, a dinner in the evening, and an engineering economics session on the morning of Jan. 16. Engineering society secretaries will conduct their seventh conference on Jan. 14.

Among specific discussion topics are social security, old age and unemployment compensation; engineers' responsibilities in social and economic questions; industrial cooperation; public works activities; rural electrification; and engineers' relation to national defense.

A. A. Potter, dean of engineering, Purdue university, Lafayette, Ind., is president of the council and F. M. Feiker, 744 Jackson Place N. W., Washington, executive secretary.

PATENT PERCUSSION POWER PRESSES



No. 16 (250 Ton)

• Zeh & Hahnemann Co. is recognized as one of the foremost authorities on modern power press practice, having specialized in this field for thirty-four years.

The No. 16, 250-ton press, illustrated, is especially suited for hot pressing brass and other non-ferrous metals; cold pressing steel parts and press forging heavier steel parts.

Zeh & Hahnemann can fulfill your press requirements for *punching, embossing, drawing, bending, forming, stamping or blanking* all types of metals. Your inquiry will receive careful personal attention.

ZEH & HAHNEMANN CO.
180 VANDERPOOL ST. NEWARK, N. J.

Men of Industry

C F. CHRISTOPHER has been appointed chief metallurgist and open-hearth superintendent, American Locomotive Co., Latrobe, Pa.. From 1923 to 1928 Mr. Christopher was employed by the Jones & Laughlin Steel Corp., starting in the inspection department, advancing to the metallurgical department, and finally to assistant superintendent of one of the open-hearth departments. From 1928 to 1934 he was employed by the United States bureau of mines, Carnegie Institute of Technology and Metallurgical Advisory board in charge of open-hearth work under the supervision of Dr. C. H. Herty Jr. Mr. Christopher entered the employ of the railway steel-spring division, American Locomotive Co., in April, 1934, as open-hearth superintendent.

♦ ♦ ♦

H. R. Weller has been appointed district sales manager at Cleveland for General Refractories Co., Philadelphia, succeeding John C. Hopkins who has resigned to become associated with the Wellman Engineering Co., Cleveland.

♦ ♦ ♦

Robert Daniels has been placed in charge of the newly established Chattanooga, Tenn., office of the Lincoln Electric Co., Cleveland. Mr. Daniels has been associated with the company in sales work since April, 1934.

♦ ♦ ♦

Fielding V. Jackson has been elected president, James H. Tower Iron Works, Providence, R. I. Other appointments are Cora M. Barney as secretary-treasurer; Hermon R. Bliss, general manager, and Howard R. Chase, contracting engineer.

♦ ♦ ♦

Frank J. Kinney has joined the sales force of the Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y. He will be located at 5407 Penn avenue, Pittsburgh, and will assist Roy W. Hurst, district manager.

♦ ♦ ♦

Edward Weatherford has become connected with the sales and service organization, Hercules Powder Co., and will be located in the Chicago office, specializing in products used by foundries. Mr. Weatherford formerly was with the Borden Co., in charge of sales and service.

♦ ♦ ♦

Howard E. Blood, recently first vice president, Borg-Warner Corp., Chicago, has been appointed executive vice president. Mr. Blood continues as president of the Norge division of Borg-Warner, as well as president of the Detroit Gear & Machine, and Detroit Vapor Stove divisions.

♦ ♦ ♦

Marion D. Harbaugh has been elected vice president, Lake Superior Iron Ore association, Cleveland. Mr. Harbaugh formerly was secretary, Tri-State Zinc and Lead Ore Producers' association of Oklahoma, Kansas and Missouri. He has been succeeded in the Tri-State association office by Evan Just, formerly production manager, Carter Oil Co.

♦ ♦ ♦

Floyd A. Beatty, formerly vice president in charge of engineering Lewis Foundry & Machine Co., Groveton, Pa., has been appointed operating vice president. Mr. Beatty joined the Lewis organization in 1925 as assistant to the chief engineer.

Fred H. Fanning, assistant chief engineer, has been named chief engineer. He has been with Lewis Foundry & Machine since 1927.

♦ ♦ ♦

Franklin R. Hoadley, who resigned as vice president, Farrel-Birming-

The Aristocrat of Bearings
HOOVER
HOOVER
The Season's Greetings to All and grateful thanks to our many customers who have passed along the good words in behalf of The Aristocrat of Bearings.
HOOVER BALL AND BEARING COMPANY
ANN ARBOR • MICHIGAN

ham Co. Inc., Ansonia, Conn., to become president of Atwood Machine Co., Stonington, Conn., Jan. 1, was presented with a silver plaque by the employes of the foundry and pattern departments of the former company "as a testimonial of their respect and esteem; with regret for the severance of the friendly associations of 22 years and with best wishes for his continued success".

♦ ♦ ♦

F. Hughes Moyer, formerly associated with William M. Bailey Co., Pittsburgh, and previously in charge of engineering for Mackintosh-Hemphill Co., Pittsburgh, has been retained in an advisory capacity in the operating department of National Tube Co., Pittsburgh. Mr. Moyer is well known in steel circles and among many previous affiliations he has held executive positions with the Cambria Steel Co., and Pittsburgh Crucible Steel Co.

♦ ♦ ♦

Tom Brown has been promoted to vice president and general manager, Autovent Fan & Blower Co., Chicago. George J. Kalwitz, formerly sales engineer, has been made general sales manager, and Robert F. Ruggles, manager of the New York office for the past few years, has been advanced to eastern division manager.

New representatives recently appointed by the company are Frank B. Nimmo, Minneapolis; R. J. Engel, Appleton, Wis.; B. J. Doyle, Milwaukee; Industrial Representatives, Peoria, Ill.; Allen T. Shepherd, Richmond, Va.; Engineering Sales & Service Corp., Louisville, Ky., and Harold M. Hudson, Seattle.

♦ ♦ ♦

M. O. Troy, manager of the central station department, General Electric Co., Schenectady, N. Y., has been named one of five new commercial vice presidents recently elected by the board of directors of the company. Others are L. T. Blaisdell, southwestern district manager, Dallas, Tex.; E. H. Ginn, southeastern district manager, Atlanta, Ga.; A. L. Jones, Rocky Mountain district manager, Denver, and T. S. Knight, New England district manager, Boston.

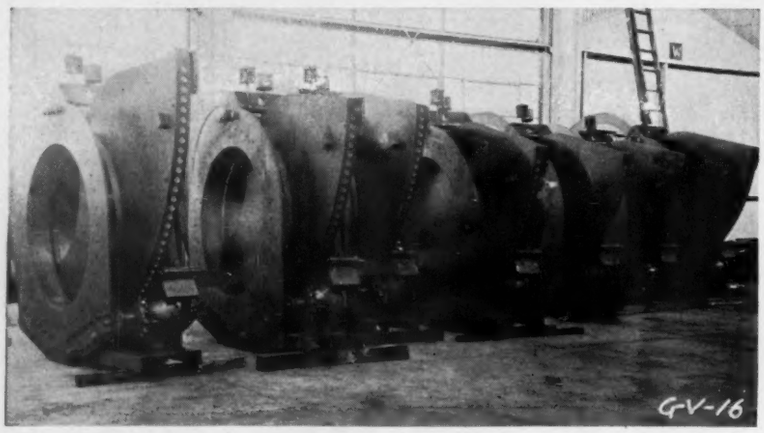
♦ ♦ ♦

R. B. Howland has been elected vice president and a director, United Engineers & Constructors Inc., Philadelphia. He had previously held the position of assistant to the president.

R. B. Howland

♦ ♦ ♦

Howard H. Talbot has been named senior engineer, with duties of general engineering consultant, United Engineering & Foundry Co., Pittsburgh. Other personnel changes, effective Jan. 1, follow: Maurice P. Sieger, assistant chief engineer, has been made chief engineer; J. W. O'Brien, assistant to Mr. Sieger, has been named assistant chief engineer; G. G. Beard, in addition to continuing in charge of proposal engineering, will be assisted by Mr. Talbot to enable him to devote most of his time to sales engineering; Dr. Morris Stone has been placed in charge of a new engineering development division, while F. C. Biggert Jr., who has relinquished the title of senior engineer, will continue as



EIGHTEEN

BROSIUS AUTOMATIC MOTOR DRIVEN GOGGLE VALVES

are now in service. Ten on Ferro Manganese gas (4 on dirty gas, 6 on clean gas) with temperatures approximating 650°. Eight valves on regular blast furnace gas (4 in dirty mains and 4 in clean mains).

The valve is self contained and independent of the gas line in its operation. The renewable valve seats are flexible, conforming to any slight distortion of the valve due to stresses in the line, thus maintaining a tight valve at all times.

A complete cycle of operation takes only 12 to 20 seconds, depending upon the size of the valve.

OTHER PRODUCTS

Steam, Hydro-Electric, and Electric-Mechanical Clay Guns, Hot Blast Valves, Stock Line Indicators, Cinder Notch Stoppers, Flue Dust Conditioners, Blast Furnace Slag Granulating Machines, Coke Testing Tumbling Barrels, Single Hook Grab Buckets, Automatic Dump Buckets, Automatic Single Hoist Grab Buckets, Overhead and Auto Floor Charging Machines for serving Heating and Melting Furnaces, Auto Floor Manipulators for serving Steam Hammers, Presses, Etc.

EDGAR E. BROSIUS INC.

ENGINEERS and MANUFACTURERS

PITTSBURGH SHARPSBURG BRANCH PA.

European Distributor
Dango & Dienenthal, Siegen, Westphalia, Germany

Brosius Equipment is Patented in the United States and Foreign Countries

vice president in general charge of engineering and research.

♦ ♦ ♦

Samuel M. Cassidy has been appointed manager, Weirton Coal Co., subsidiary of Weirton Steel Co., Weirton, W. Va. Mr. Cassidy will be located at the company's mine at Isabella, Pa. He succeeds O. G. Leichliter, who has resigned to devote his time to oil interests in the Southwest. During the past year he has been associated with Robert S. Walker, consulting engineer, M. A. Hanna Co., Cleveland.

♦ ♦ ♦

William P. Chinn, Duluth, general manager of ore properties for Pickands, Mather & Co., and closely identified for many years with the development of the iron mining industry in the northwest, retired Jan. 1. He has been succeeded by A. D. Chisholm, assistant general manager.

Mr. Chinn first became employed at the Soudan mine, Tower, Minn., as a general mine laborer and later was given the position of timekeeper and office man. He was appointed general manager on Jan. 1, 1922.

Mr. Chisholm became associated with the company in 1924 as Gogebic range manager. In 1927 he was advanced to Michigan manager, and in 1931, to assistant general manager.

Died:

HARRY BLOODSWORTH, 68, vice president and treasurer, Crucible Steel Casting Co., Lansdowne, Pa., in Lansdowne, Pa., Dec. 22. Mr. Bloodsworth had been identified with the steel industry since 1889. He began his career with the Stickney Iron Co., Baltimore, and later became associated with the Tidewater Steel Co., American Steel Casting Co., Chester Steel Casting Co., all of Chester, Pa. In 1905 he became one of the founders of the Crucible company.

♦ ♦ ♦

Victor F. Gamble, 50, president, Vulcan Steam Forging Co., Buffalo, in that city, Dec. 25. He had been head of the firm for many years.

♦ ♦ ♦

R. R. Darden, assistant auditor, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., in Fairfield, Ala., Dec. 23.

♦ ♦ ♦

Charles A. Bodman, 57, manager, Magnus Metal Co., Denver, for 17 years, in that city, Dec. 17. A native of Chicago, he entered the steel business shortly after leaving school.

♦ ♦ ♦

Paul J. Neely, chief metallurgist, railway steel-spring division, American Locomotive Co., at Latrobe, Pa., Dec. 10. Mr. Neely entered the employ of the Latrobe plant in 1903 as a boy in the chemical laboratory, and advanced through his 33 years of employment at this plant until he attained the position of chief metallurgist.

♦ ♦ ♦

H. H. Veerhusen, 46, assistant to E. R. Stettinius Jr., chairman of the finance committee, United States Steel Corp., New York, in that city, Dec. 23. He was with the Solvay Sales Corp. from 1932 until 1935.

♦ ♦ ♦

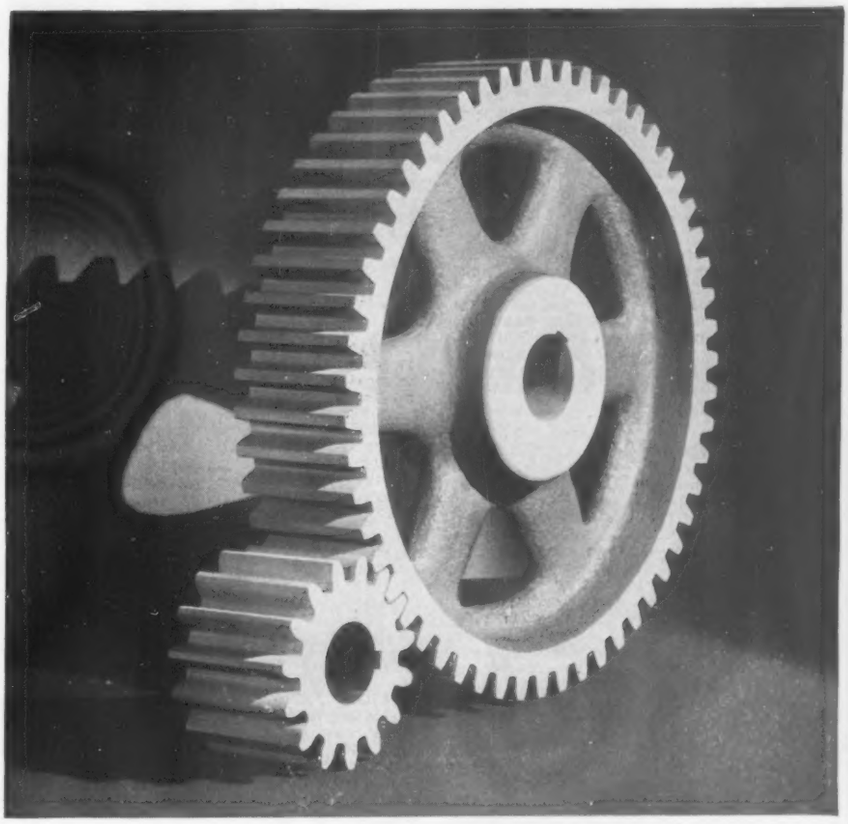
M. F. Gartland, 79, a Marion, Ind., manufacturer for nearly half a century, in Marion general hospital, recently. He was chairman of the Atlas Foundry which owns and operates two foundries in Marion, and also was chairman, Gartland Toledo Foundry Co., Toledo, O., and G. & C. McCarthy Foundry Co., Chicago. He was a director, Dayton Malleable Iron Co., Dayton, O.

♦ ♦ ♦

Alvah K. Lawrie, 84, for 40 years affiliated with the Aluminum Co. of America, serving as sales manager, director and vice president and retired for a number of years, at Thomasville, Ga., Dec. 24.

♦ ♦ ♦

William C. North, 84, manufac-



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● From an ounce to 20,000 pounds . . . all Horsburgh & Scott gears, whether spur or any other kind in industrial use, are of the rugged "husky" type . . . built to endure. A half century of experience, unceasing vigilance in the selection of materials and painstaking care in design and manufacture, make Horsburgh & Scott gears the finest in the world. You'll find proof in their trial.

A helpful 448 page Gear Book awaits your request.

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

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turer and inventor, at Cleveland, Dec. 23. Mr. North began his business career with Lamson & Sessions Co., Cleveland. He invented the so-called "North bolt." He was general manager of the Cleveland Bolt Mfg. Co., subsidiary of National Screw & Tack Co. and in 1906 helped organize the Ferry Cap & Set Screw Co. He retired in 1913.

♦ ♦ ♦

James S. Paterson, 74, identified for a number of years with the sheet steel industry in the Mahoning valley and later with its establishment at Buffalo, in Bethlehem, Pa., Dec. 26. He was president and manager, Niles Iron & Sheet Co., Niles, O., from May, 1901, until 1906 when he disposed of his interests in the firm and went to Buffalo. There he organized the Seneca Iron & Steel Co., of which he was president many years. He then retired and the Seneca works were sold to Bethlehem Steel Co. several years ago.

♦ ♦ ♦

John B. Monahan, 70, former mill superintendent, Colorado Fuel & Iron Corp., Denver and Pueblo, Colo., at Gary, Ind., Dec. 18. At one time he was superintendent of a rail mill at Gary and also consulting engineer for the Tennessee Coal, Iron & Railroad Co.

♦ ♦ ♦

Frank J. McNeive, 60, general manager, W. F. Potts, Son & Co. Inc., Philadelphia, and vice president, National Association of Sheet Metal Distributors, Philadelphia, at his home in Lansdowne, Pa., Dec. 22.

♦ ♦ ♦

David M. Ireland, 85, pioneer in Detroit metal manufacture, at his home in that city, Dec. 26. At the time of his death Mr. Ireland still had an active interest in the Independent Stove Co., Owosso, Mich. He founded and became president, Ireland & Matthews Mfg. Co., Detroit, dealer in brass and plumbing supplies, and when that company was sold, he founded the Michigan Copper & Brass Mfg. Co. After disposing of his interest in that company to the Revere Copper & Brass Mfg. Co., he organized the Wolverine Bolt Co. and the Detroit Metal Specialty Co.

Behind the Scenes with STEEL

Your Verdict Awaited

AWAY out here on page 408, we extend New Year's greetings and trust that STEEL'S initial effort for 1937 meets with your approval. We believe it's the greatest *Yearbook* ever, but of course we might be prejudiced. At least it's the biggest since 1930—262½ pages of advertising presented by 330 advertisers; well over 170 pages of editorial material, all of which we commend to your studied attention.

* * *

Scratchboard

THOSE numerous art layouts in color which you have seen throughout the book were done by Manning Studios, Cleveland, using a technique known as scratchboard, in which a sharp stylus replaces the usual paintbrush and pen. It takes an able artist and a lot of time to turn them out, but the effect is striking. Our favorites are the "Construction" layout on page 246, "Railroads" on page 250, and "Materials Handling" on page 281.

* * *

Camera

VAN FISHER and his candid Contax camera produced some interesting photographic studies for the issue. Van is an energetic cameraman, climbing up into cranes, onto roofs, and under tables for different angles for his shots. After he shoots two or three hundred views he picks the best for enlargement. Actual size of the negatives, you know, is about 1¼ by 1 inch; they enlarge perfectly up to 8 by 10 inches for publication use. Examples of his work are reproduced effectively on pages 235, 238, 243, 244, 276, 277, 279, 318 and elsewhere.

* * *

Directory

THAT handy supplement, pages 63-78, giving a list of the trade names of alloy steels and irons should meet with much favor as reference material. It represents many long hours of compilation, checking and cross-checking on the part of Associate Editor Erle Ross who superintended the entire job, and is much more complete than the listing published at the beginning of 1936. Plans are under way to have a supply of this supplement available for anyone who has need for a copy.

* * *

Doplexed

IF YOU'RE wondering about our slippery cover and marveling at its smooth, snappy appearance, let us hasten to inform you that it has been Doplexed by the Dobeckmun Co. If that means as much to you as it does to us, we had better explain that the outside covers have been surfaced with sheets of cellophane by a heat-pressure method.

Practically every Christmas gift we received this year was also thoroughly Doplexed, but that's another story. For further details of this innovation, see the insert opposite page 342.

* * *

Break for the Eyes

WHILE you are struggling away trying to read this 6-point-solid type, may we point back to the forward part of the *Yearbook* which is set entirely in 9-point type, two columns to the page, for easy legibility. You can set the magazine on your mantel at home and read all articles at ten paces with utter facility.

* * *

Curves

SWEET and hot are the three lovelies who have invaded the pages of this *Yearbook*, to supply the eternal S.A. which these days appears to be essential everywhere. If you missed these honeys, look back to pages 263, 265, and 266. Names on request, accompanied by proper credentials.

* * *

No Co-operation

POOEY to Premier Mussolini for clamping down censorship restrictions on production statistics of Italian industry, which meant that this year our customary review of business in Italy had to be "liquidated." Just for that we won't send Il Duce a copy of the issue.

—SHRDLU

Convention Calendar

Jan. 7-11—American Engineering council. Annual meeting in Washington. F. M. Feiker, 744 Jackson Place N. W., Washington, is secretary.

Jan. 11-15—Society of Automotive Engineers. Annual meeting at Book-Cadillac hotel, Detroit. John A. C. Warner, 29 West Thirty-ninth street, New York, is general manager.

Jan. 11-16—American Road Builders association. Annual convention and exhibit in New Orleans. Charles M. Upham, 952 National Press building, Washington, is secretary.

Jan. 12—Mining and Metallurgical Society of America. Annual meeting in New York. Percy E. Barbour, 90 Broad street, New York, is secretary.

Jan. 14-16—Institute of Scrap Iron and Steel. Ninth annual convention at Netherland Plaza hotel, Cincinnati. Benjamin Schwartz, 11 West Forty-second street, New York, is director general.

Jan. 24-29—Canning Machinery and Supplies association. Annual convention and show at Stevens hotel, Chicago. S. G. Gorsline, Merchandise Mart, Chicago, is secretary.

Jan. 25-27—American Society of Heating and Ventilating Engineers. Annual convention at Hotel Statler, St. Louis. A. V. Hutchinson, 51 Madison avenue, New York, is secretary.

Jan. 25-29—American Institute of Electrical Engineers. Annual winter convention at Engineering Societies building, New York. H. H. Henline, 33 West Thirty-ninth street, New York, is secretary.

Feb. 14-19—National Electrical Manufacturers' association. Midwinter meeting at Waldorf-Astoria, New York. W. J. Donald, 155 East Forty-fourth street, New York, is managing director.

Feb. 28-March 19—Leipzig Trade Fair. To be held at Leipzig, Germany. American headquarters at 10 East Fortieth street, New York.

Activities of Steel Users and Makers

AMERICAN CHAIN CO'S name has been enlarged to the American Chain & Cable Co. Inc. In addition to chain and wire rope, many other essential products are manufactured by the following divisions and associates: American Chain; Andrew C. Campbell; Manley Manufacturing; Page Steel & Wire; Wright Manufacturing; American Cable; Ford Chain Block; Hazard Wire Rope; Highland Iron & Steel; Owen Silent Spring; Reading-Pratt & Cady and Reading Steel Casting Co.

General executive offices will remain at Bridgeport, Conn., and 230 Park avenue, New York. Directors recently elected W. B. Lashar chairman of the board; W. T. Morris, president; Wilmot F. Wheeler, executive vice president and treasurer; A. P. Van Schaick, vice president in charge of sales; C. G. Williams, vice president in charge of production; W. M. Wheeler, secretary; Frederick C. Geier, assistant secretary; and Stanley Mann, comptroller.

♦ ♦ ♦

Pittsburgh Can Co., Pittsburgh, has been acquired by the National Can Co., subsidiary of McKeesport Tin Plate Co., McKeesport, Pa.

♦ ♦ ♦

Kilby Car & Foundry Co., Anniston, Ala., recently added a small steel foundry for making cast steel and alloy steel castings. The company also is making plans for producing carbon steel, tool steel, S. A. E. and other analyses.

♦ ♦ ♦

Morgan Construction Co., Worcester, Mass., has granted to Mesta Machine Co., Pittsburgh, a license to manufacture oil film bearings under the former company's patents. This bearing is a totally enclosed precision oil film bearing for use on the necks of the rolls in a rolling mill.

♦ ♦ ♦

Warman Steel Casting Co., Los Angeles, producer of electric steel castings, has entered into commercial production of 18-8 chromium nickel stainless steel castings containing columbium. The company recently has run a considerable number of heats of this type.

♦ ♦ ♦

Great Western Steel Co., Chicago, specializing in sheet mill products, has entered the Detroit area by acquiring the sheet business of the McLouth Steel Corp., known for many years as the Consolidated Steel Corp., and will continue the business under this name at 1645 Beard avenue, Detroit. Production began Jan. 1. This move was prompted by the desire of the McLouth organization to confine itself, and expand rolling mill facilities, to serve hot strip consumers. Improvements are now under way which will greatly increase production of strip steel.

♦ ♦ ♦

Pennsylvania Tube Co. has been organized with $50,000 capital to make steel tubes at Bridgeport, Pa. A plant formerly used for fabricating structural steel has been leased. Production is scheduled to start Feb. 1. Lester Cutter, Pittsburgh, is president; Clarence A. Young, Youngstown, vice president; William R. Kalson, Pittsburgh. secretary; and Phillip Levin, New York, treasurer.

Tennessee Products' Plans For Reorganization Complete

Tennessee Products Corp.'s reorganization under section 77-B of the amended bankruptcy act has been completed. Frederic Leake, president, has announced that from funds obtained from the Reconstruc-

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tion Finance Corp. certain amounts will be set aside for plant improvement which will enable the company to increase the volume of its principal products.

At the Wrigley furnace it manufactures semi-cold blast charcoal iron of both high phosphorus and low phosphorus content, and at its Gray furnace, Rockdale, Tenn., it makes standard ferrophosphorus. It also manufactures by-product coke, domestic gas and other by-products, acetic acid, methanol, and heavy chemicals.

Holders of first mortgage 6½ per cent bonds due Jan. 1, 1936, amounting to $1,020,500, will be entitled to receive for each $1000 bond, together with interest coupons from Jan. 1, 1934, $575 in cash and 85 shares of new common stock. The holder of first mortgage 5 and 5½ per cent bonds, amounting to $383,000, will be entitled to receive $275,000 in cash. These bonds are held by the war department on the Wrigley plant only.

On the five-year 6 per cent gold notes due Oct. 15, 1935, each holder is entitled to receive one share of new common stock for each $5 of principal of these notes, and on the other unsecured ten-year 6 per cent gold notes due Feb. 1, 1936, a similar settlement has been made.

CUNNINGHAM
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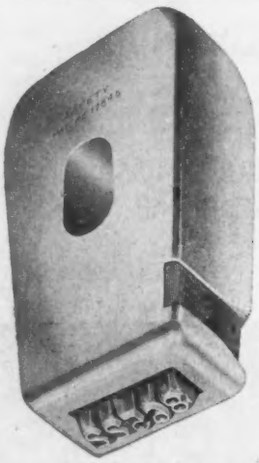
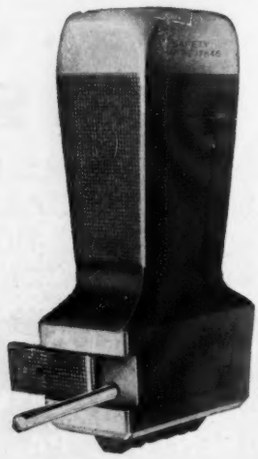


PAT. RE-17846
OTHER PATENTS
PENDING



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Weirton Blast Furnace Improved, Relighted

After a 54-day shut down for repairs and improvements, following a run of six years and seven months, Weirton Steel Co.'s No. 1 blast furnace, Weirton, W. Va., has resumed operation.

Relining and improvement of auxiliary equipment cost more than $750,000. In the relining 791,000 9-inch equivalent brick were laid in the exceptionally short period of 17 days.

Weirton officials said that to the best of their knowledge the run established a new record. In the period the furnace produced 1,856,584 gross tons of pig iron (STEEL, Nov. 30, 1936, p. 18).

Along with the relining of the blast furnace, four stoves were rebuilt and Brassert inserts installed, increasing the heating capacity approximately 60 per cent. A complete gas-cleaning system also was installed to reduce dust content to 0.01 to 0.02 grains per cubic foot.

Dickinson Resigns From Department of Justice

Assistant Attorney General John Dickinson, chief of that branch of the department of justice which has been investigating alleged collusive steel bidding, has resigned effective Jan. 20, to engage in private practice.

In Washington it is reported that the survey, in which Mr. Dickinson took a personal interest, is far from being completed. Recently he declared that the anti-trust laws must be revised if they are to be effective. He formerly was assistant secretary of commerce, and is an authority on constitutional law.

Edison Medal To Be Presented to Dr. Dow

The Edison medal for 1936 has been awarded by the American Institute of Electrical Engineers to Dr. Alex Dow, "for outstanding leadership in the development of the central station industry and its service to the public."

The Edison medal was founded by associates and friends of Thomas A. Edison, and is awarded annually for "meritorious achievement in electrical science, electrical engineering, or the electrical arts" by a committee consisting of 24 members of the institute.

The medal will be presented to Dr. Dow during the winter convention of the institute, New York, Jan. 25-29.

Market Summary

(*Concluded from Page* 342)

mand, but to the suspension of Spanish shipments. Increasing ocean freight rates also were a factor in higher prices for foreign ore.

Sharp improvement in blast furnace activity stimulated the long dormant beehive coke industry with a result that over 3000 beehive ovens were on schedule in the Pittsburgh area as the year ended. By late in the year seven blast furnaces at Pittsburgh were depending on beehive coke in the absence of by-product coke supplies.

This accounted for the sharp rise in furnace coke in the last half, a rise that was also accompanied by increased prices in by-product coke for both domestic and metallurgical purposes. In the East, two merchant furnaces blew out near the end of the year to take advantage of the strong market in by-product coke.

Stability characterized the merchant pipe market, except principally in the New York metropolitan area, where resale offerings continued highly unsettled throughout the greater portion of the year. Buying, however, improved substantially; in fact, every principal classification of pipe and tubing in the first three quarters ran ahead of the entire year of 1935, according to the American Iron and Steel institute's compilation of production for sale by member companies. This was likewise true in plates and shapes, with merchant bars falling just a bit short.

Line pipe work included some good tonnages, leading with 50,000 tons for a line for the Columbia Gas & Electric Co. leading into Detroit and 25,000 tons for a line for the Shell Union Oil Co. in California. A downward adjustment of pipe prices in March resulted in declines of as much as $5 in butt-weld pipe, the principal item affected.

Two vehicular tunnel projects in New York city, involving a total of 102,700 tons of cast segments, came up for bidding in December.

Washington

(*Concluded from Page* 270)

another question. His intentions are of the best and he has several times stuck his neck out on behalf of industry only to get a rabbit punch from the White House.

Mr. Roper is much interested in the work of his business advisory council of which Myron Taylor and other steel executives are members. There is a chance this council may become more important as the year goes on—at least that is the inten-

WIRE

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tion of the commerce department. One thing is certain, there are some active executive members of the council and if they do not go places it will be their own doing because it is known the President has also expressed considerable interest in their work.

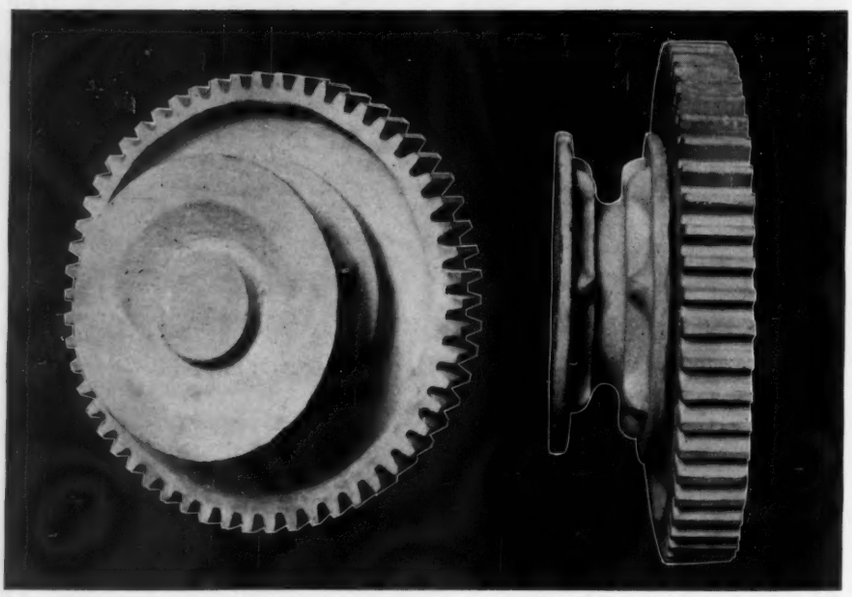
Possibility is heard that the department of commerce may become more useful to the steel and other industries than it has up to this time through the establishment of the proposed new bureau of industrial economics, comparable to the bureau of agricultural economics of the department of agriculture. Secretary Roper has asked for $400,000 to start this work and there is every indication congress will grant his request. This proposed bureau would take up many economic questions as applied to business and industry which have never been tackled by the department.

Another matter about which it is impossible to forecast but which will have considerable effect on the steel industry—the question of freight charges as decided by the interstate commerce commission.

The commission has announced that it will hold hearings this month dealing with the separate applications made by the railroads for freight rate charges. It is anticipated that these hearings will continue for some time and it will probably be several months before any final decision is handed down. While business has been materially better during the past few months, it is fair to assume that the commission is going to help the railroads out to some extent in view of the fact that the emergency surcharge rates will become ineffective when the commission's decision is announced, or shortly thereafter.

So, here are a few of the legislative-industrial puzzles. Their answers can only be read from the record of 1937. At least industry appears in a better position and more willing to co-operate with government—which is something. But whatever way the cat jumps, be sure someone will get scratched.

COMBINATION GEAR AND LOAD WHEEL



●A very intricate casting to make perfectly, not only because the teeth must be as nearly accurate as it is possible to cast them—but—the grooves for the chain are extremely important.

●If these grooves are not accurately made, the casting cannot be used because even very slight variations in the grooves will cause the chain to "ride" or possibly leave the grooves entirely.

●This is one of many examples of accurate castings made by

FORT PITT STEEL CASTING CO.

McKeesport, Pa.

Public Relations

(*Continued from Page* 245)

of poverty, unemployment and others accentuated by the depression.

"Industry fills a double function. It is a maker of goods. It also is an exchange through which the worker trades the products of his specialized skill for the other products that he needs. There is hardly a person who would have anything but praise for industry's performance of the first function—that of making goods. Now it is demanded that industrial leaders improve the second function—that they develop industry so that its efficiency as an exchange will equal its efficiency as a maker of goods, and thereby improve industry's social function as they have already improved the technological function.

Explains Popular Sentiment

"This seems to be the essence of the popular feeling today. It explains popular support of certain legislation which politicians have enacted and attempted to enact. It explains a frequently heard but inaccurate statement that the American people now distrust industry. The American people are sold a thousand per cent on *industry*. They know that industry provides both goods and employment. But there is a disappointment with *management*. Our American way of life rests on an economic foundation. Throughout our history our real leaders have been economic leaders. The people have instinctively looked to those leaders—or management—to provide them with the opportunity to work, to acquire goods and savings, and to be secure in them.

"When huge numbers were de-

prived of work, of savings and of security, many felt that management had failed them, and doubted the ability or inclination of management to provide these things. They searched for other solutions and turned to other leaders.

"Several steps suggest themselves. First, whatever is wrong in present industrial actions and policies, industry should be the first to recognize and correct. Second, whatever is right in industrial action and policy should be retained and defended against all odds. Third, within industry's limits and in accordance with sound principles, industrial leadership should now attempt constructively to influence human conditions surrounding production. Fourth, industry should keep the public fully informed of its actions and policies. It should speak constructively.

"One is struck not alone by the vastness or complexity of these problems, but even more by the astoundingly small stock of information we have on them. Yet they are vital in the working of our economic system. Consider the matter of unemployment. We do not even know the *number* of unemployed. At least a dozen estimates of the number of jobless have been published recently by government officials, public and private agencies. *These estimates vary from* 3,000,000 *to* 11,000,000 No one *knows*. Yet on the mere assurance that there is great unemployment and that it will continue as a permanent state, legislation is proposed like the 30-hour week bill, which might prove of permanent harm to our economic system.

"We will never make progress toward improving the human conditions resulting from economic actions until we learn the facts about them."

PAUL W. GARRETT, director of public relations, General Motors Corp., New York, believes there is a technique of public relations that, most carefully observed, will secure definite and tangible reactions. He notes that most of this technique is not new, but it is important because our concept of public relations has changed materially in the past few years. No longer is the success of an industry or corporation with the public measured by publicity lineage, nor is it enough for industry to follow in the wake of public thought.

"We must anticipate public trends," declares Mr. Garrett, "by listening more to what people tell us—by determining what pressures they are under which impel them to certain actions. We must avoid complacency and the feeling that increasing volume is the answer to all questions. We should remember that the world is made up of friends of industry and future friends, and we should strive against ever letting this fact get into reverse. We must serve our neighbor better in the knowledge that his future is our future."

IN HIS position as director of industrial relations for the Republic Steel Corp., J. A. Voss has had opportunity to come in close contact with many of these problems relating to industry and the public. He sees them as a "very important part of the organization of every aggressive business today."

"It is only recently," Mr. Voss continues, "that industry has made an attempt to interpret itself, to explain its place in the economic picture, and to develop the value which it has to the nation as a whole. True, there are some exceptions to this, principally among the consumer industries which have direct contact with the buying public and realize the value of goodwill. In these days of economic questionings, however, this desire for goodwill should not be confined to the consumer indus-

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tries only. It should be one of the objectives of every manufacturer, irrespective of size or type of product.

"By seeking goodwill, industry need only state facts. These facts are strong enough to justify, if justification is needed, the place of business in our national life.

"Industry should acquaint the public with the facts about its operation, about its finance, about its industrial relations program. The public has had only one side of the picture and it is now time that industry tell its own story.

"If industry as a whole does as good a job in its public relations, as large parts of it have done in their industrial relations, there will be little need for future misunderstanding. The larger companies, particularly, have handled industrial relations as a serious, definite problem and have made it the responsibility of an official high enough to speak with authority. If this were done by all companies, large and small, there would be a minimum of labor disputes, a minimum of dissension, and a maximum of harmonious industrial relations throughout the country."

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American Safety Cinder Notch Stopper
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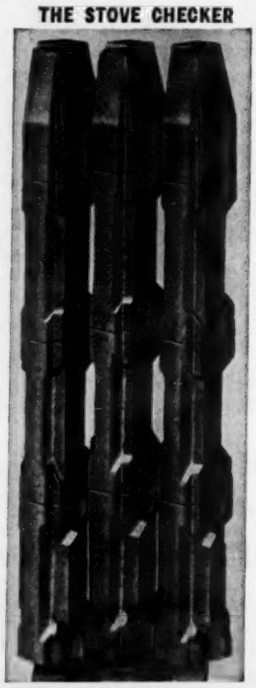
American Pig Releaser
American Ladle Skulling Hook
American Gas Seal for Gauge Rods

* * * *

THE STOVE CHECKER



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Engineers
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Metal Finishing

(*Continued from Page* 301)

seemed to warrant it. Better quality is a matter of prime consideration and need. Great improvements have been made and still greater improvements are desired. It is true that it is desirable to keep the cost factor down in producing better quality, and there have been many things contributing toward this end. Among them I might mention better equipment, for example, the automatic polishing machines and automatic plating machines, and in this connection should be mentioned bright nickel plating which enables the industry to apply a heavy protective layer of metal and removes the necessity of buffing it off. It would seem that more steps of this kind in the improvement of equipment and process are in store."

IN ADDITION to agreeing with above statements regarding electroplating, Robert J. McKay. development and research division, International Nickel Co. Inc., New York, makes the following significant statement: "Laboratory measurements of the properties and service tests of electroplates indicate the time-honored view that electroplate is porous and weak is not true under modern conditions. Careful tests of zinc coatings, for instance, show that the electroplate, thickness for thickness, is just as protective as the hot dipped coating. Comparison of the porosity of electroplated nickel, thickness for thickness, with hot dipped tin shows a superiority in continuity of coating for the nickel. A proper combination of electroplating with hot dipping of tin produces better protection, pound for pound, than hot dipping alone.

"The important developments in 1936 were the advancement of low cost production processes on strip, wire and fabricated articles, the improvement in bright plating and other processes, the wider use of specifications for heavier and better electroplate, and a more favorable industrial sentiment toward improved practice.

"To get ready for prosperity, the plating industry has developed a backlog of laboratory and technical results and engineering possibilities for more efficient plating and new types of electrodeposits. Higher standards of work encourage new demand for a better product.

"To create demand and use, industry desires a finished product of lowest possible output cost and sales appeal. A powerful aid to this end is a coating of attractive appearance, giving sound protection of base

metal and economy of application. During 1937, the low cost of production plating as compared with hot dipping may bring new metals into the field of metal coated steel with resulting improvement in the protective coatings and widened use for protected steels. We can look for continued improvement in the quality of electrodeposited items such as automobile parts and possibly hardware. Also for an extension of uses due to technical developments. More uses and better plates will extend the tonnage of protected steel and of protecting metals.

"Restrictions due to legal status and other such outside influences should not retard progress. On the whole the movement is toward less centralizing and, therefore, wider use of new plating processes.

"The demand for electroplates of the precious metals, particularly rhodium, has continued to increase throughout the year and had spread to many new fields. The percentage of world nickel used for electroplating has doubled in recent years in spite of wide advances in the tonnage uses of nickel in other industries. This advance is directly attributable to the improvement in quality of the product.

"In Great Britain, electroforming is on a sound commercial basis and a number of interesting developments have occurred. It is, as yet, only being accomplished in this country in a tentative way. With the knowledge and ingenuity in the American plating industry there seems little doubt that some of the things being tried tentatively will bloom into commercial significance before long."

THE porcelain enamel industry has had a banner year in 1936, continuing a specific and remarkable growth of the last several years," J. E. Hansen, director, service department, Ferro Enamel Corp., Cleveland, observes. "Complete figures for the year of 1936 are not yet available, but as an example, during the first six months the frit manufacturing industry shipped approximately 25 per cent more enamel than during the entire year of 1929, which is usually considered the high point in America's industrial life. Incomplete figures indicate that the frit manufacturing industry probably shipped approximately 40 per cent more enamel in 1936 than they did in 1935. This increase in the popularity of porcelain enamel is in spite of competition of such materials as stainless steel, copper, aluminum, lacquers, Monel metal, and a growing use of plastics.

"Kitchen ware, enameled stoves, refrigerators, table tops and porcelain enameled architectural parts are responsible for the major portion of this frit tonnage, the most rapid percentage increase undoubtedly being in the field of architecture.

"During the year, the industry has recognized more strongly than ever the importance of design. For the first time there is available a handbook on design, compiled and printed by the Porcelain Enamel institute. This handbook is a recognition of the fact that porcelain enameling has left the craft stage, and is now a production proposition, subject to rules which, if carried out consistently, eliminate trouble and loss.

"Chipping has been studied from a technical viewpoint. Dr. H. H. Holscher, Edison General Electric Appliance Co., Chicago, has presented an excellent study on proper radii for curved enameled parts, and is also responsible for some valuable conclusions on the relation between shipping and the thickness of porcelain enamel coatings. For instance, in this study he found losses in enameled parts with thicknesses above 0.021-inch nearly seven times those below 0.018-inch. This and other studies have allowed the industry to establish standards for the control of thickness of enamels.

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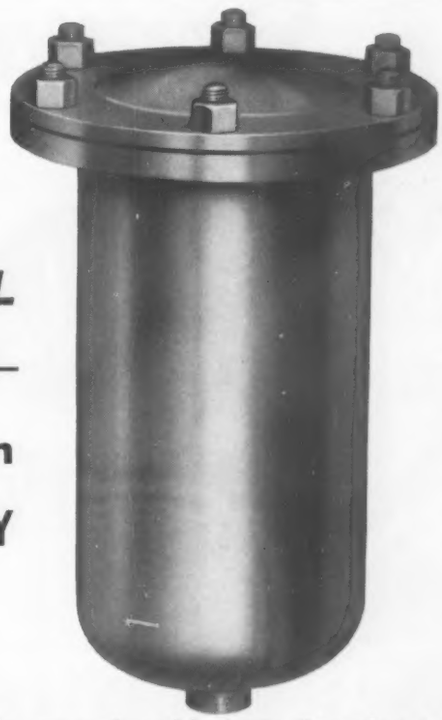

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DEEP DRAWN SHELLS AND SHAPES

When these control standards are rigorously adhered to, chipping is practically eliminated.

"The frit industry likewise contributed largely to the elimination of chipping by increasing the opacity of frits, so that acceptable covering power has been secured with much thinner coats. There have also been other important savings accomplished, due to the reduction in the quantity of enamel necessary and to the amount of expensive opacifiers required. With these more opaque frits, this year millions of square feet of metal have been finished in only one cover coat, particularly in the refrigeration industry but also to some extent in the stove industry. This year has brought forth several radical changes in the design of enameled parts, the most noteworthy being the introduction as a production item of one-piece shells or exteriors for refrigerators and stove bodies.

"In equipment in the industry, an increasingly large number of plants have installed magnetic separators for the removal of iron from the enamel slip and there has been further introduction and refinement of control systems. The new gas fired radiant tube furnace, eliminating muffles and piers is attracting considerable attention and making important cost reductions in many plants.

"During 1937 we should see further refinement in control systems and perhaps in air conditioning of enamel shops with particular reference to preventing outside dirt from drifting into the shops. The enamels of the immediate future will certainly include workable acid-resisting and stainless enamels, particularly for use on horizontal surfaces. Ground coat enamels will burn at lower temperatures and certainly will have still better adherence. Cast iron enamels will tend more and more to be both leadless and stainless. Matte finishes will be used more freely, particularly on architectural enameled work and similar uses."

R. G. Calton, Tennessee Enamel Mfg. Co., Nashville, Tenn., states, "I believe the most forward step the Porcelain Enamel institute has made in the past year is the program adopted at the last annual meeting for the expansion of the educational bureau program. The activities of the bureau call for further technical research, a study of operating problems and a program of education which will point out the virtues of porcelain enamel as a finish."

THE future of colored steel seems to be assured. Consensus of opinion among industrial designers without exception appears to confirm this. Many other interesting trends and developments have come to the attention of these men, who create sales by creating desirability.

"One of the most interesting developments has been the wide acceptance of chrome-finish steel furniture during the past year for home and commercial interiors, say Alphons Bach, designer, New York. "Steel furniture has only started to enter homes and the coming year will prove more and more their adaptability. Somehow, I vision great concerns operating on mass production, with yearly style changes similar to the automobile industry."

John Vassos, designer of radios, believes stainless steel to be the finest achievement in metallic expression. He also says, "Satin chrome was the outstanding finish and is used most extensively by contemporary designers, because it does not show finger marks; it has depth, beautiful color and fine texture." Mr. Vassos predicted an extensive use of color in connection with steel products.

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DAMASCUS MANGANESE CASTINGS

Manganese and Alloy Steel Castings One Half to One Thousand Pounds Produced in our modernly equipped foundry from electric furnace steel and heat-treated in automatically controlled gas-fired furnaces.

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DAMASCUS STEEL CASTINGS
(Manganese and Alloy)

especially of steel alloys, might to their own advantage start an educational campaign with product designers," says J. F. Barnes, Barnes & Reinecke, industrial designers, Chicago. "The designer is always willing and ready to make use of new materials, but will, of course, hesitate to specify their use unless he is familiar with their qualities and properties. Remember that the designer has played a most important part in revising the nation's business and will continue to do his part next year if given the co-operation of the material manufacturers. Redesign, often utilizing new materials as a basis, has brought consumer goods back to a pre-depression level. Redesign can do the same job for the heavy or capital goods industries—the industries which account for the greatest consumption of steel and steel alloys."

Henry Dreyfuss, industrial designer, New York, is especially interested in the development of permanent color finishes on steel. He says, "If these developments such as permanent coloring on stainless steel can be carried to a point where the material can be used inexpensively, it will widen tremendously the scope for design possibilities." Mr. Dreyfuss has made use of magnesium alloys in his work and visualizes a promising future for this metal now that the more difficult of the finishing problems have been removed by the technicians.

Frederick Abbott Leisen, designer, says, "I have been able to carry several design schemes and obtain some very desirable color effects on metal by the use of a comparatively new cellulose plastic coating. In planning a series of stoves recently, I found this finish desirable for certain fixtures and accessories where color was desired and which had to withstand moderately high temperatures. Another point was that some of the parts were die castings and hence could not be treated with vitreous enamel."

RAPID advances in making of lacquers and enamels to resist all types of corrosion and requiring special properties such as electrical insulation, acid resistance and many others has developed to the point where such finishes can be "tailor made" to suit almost any purpose. Herbert G. Clopper, Newark Varnish Works, Newark, N. J., says, "In the paint, varnish and lacquer industry, the year 1936 will be noted for a steady development toward perfection along lines heretofore developed rather than for any revolutionary changes in technique or materials. Synthetic materials still continue to hold the limelight and will increase in importance, but it is not likely that they will ever wholly displace nitrocellulose lacquers, properly formulated, as some appear to think likely. The industry has played a very important part in supplying materials required for the rapidly expanding business of the past year, and is prepared to meet the calls that will be made on it in the future, both by the building industry and the general improvement in business. The output of numerous industries would not be saleable without the co-operation of our industry, and every effort is being made to supply the type of finishing materials that will give the greatest satisfaction for the purpose intended."

The importance of research is again emphasized by Benjamin Joachim, Joachim Research Laboratories Inc., Brooklyn, N. Y., who declares that "1936 has perfected finishes which show exceptional superiority in resisting alkalies, acids, fumes, brine, heat, humidity, ultraviolet rays, corrosion, mildewing, atmospheric destruction and the like. Great progress has been made in the study of the corrosion of steel and its protection through the use of paints. As a result of progress in

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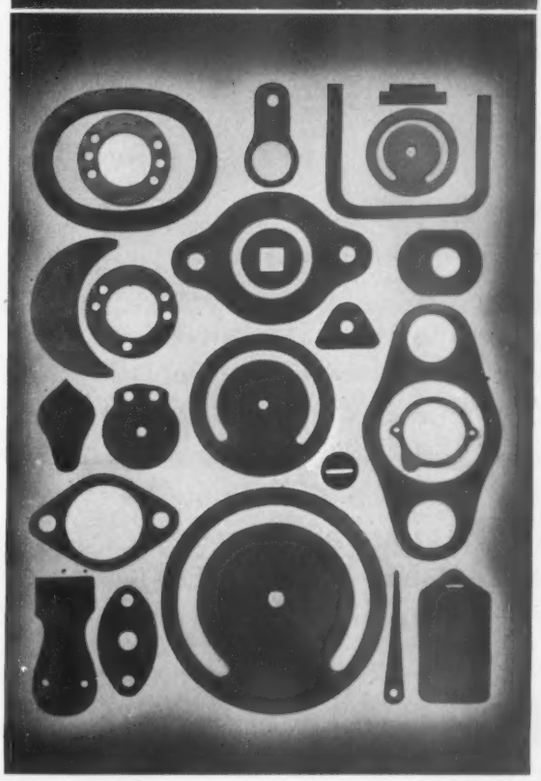

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raw material research and practical engineering in its application, we can expect a host of new finishes designed with new pigments, oils, resins, chemicals, and other paint ingredients. 1937 will be a truly synthetic finish year."

Merchandising too has come in for its share of attention in the paint industry. Ernest T. Trigg, president, National Paint, Varnish and Lacquer Association Inc., Washington, says, "The outstanding important developments in the paint, varnish and lacquer industry in 1936 have included the following: (1) Development of a better merchandising method, in line with practices which have been established successfully in other lines of business, through the sale of paint and varnish products and painting jobs on installment plans. (2) continued increase in sales of products of the industry as compared with the depression years; (3) development of the vogue for painting brick, stucco, stone, concrete and metal structures; (4) promotion of painting for 'better light—better sight,' and (5) technical advance in perfecting the products of the industry, notably by increased and more scientific use of synthetic resins."

Developments in 1936 in spray equipment for the application of paint, varnish and lacquer have been of such general nature that it would be difficult to point to any specific items of equipment as being an outstanding contribution by the spray equipment manufacturers. B. C. Gardner, DeVilbiss Co., Toledo, O., says, "Briefly we would summarize the three principal developments in spray finishing equipment to be: (1) Continued adaption of spray equipment to the changes taking place in finishing materials; (2) further development and more extensive use of water wash and other types of modern exhaust systems, to more adequately handle the vapor and residue of the newer finishing materials; and (3) many unusual machines for automatic operation in high speed product finishing.

"It is, of course, the responsibility of the spray equipment manufacturers to keep their equipment abreast of changes which are taking place constantly in finishing processes and materials. This job has been well done as can be seen from the hundreds of spray gun nozzle combinations each manufacturer must carry to best adapt his spray guns to these changing conditions."

Several improvements in organic finishes are pointed out by Carl J. Schumann, Hilo Varnish Corp., Brooklyn, N. Y. One is a heat-resisting aluminum coating which can be raised to a red heat without damage. Another is a clear lacquer for chromium plate, said to have unusual adhesion. A third is an improved wrinkle or shrivel finish, the use of which has gained considerably during 1936, according to Mr. Schumann.

Increased use of steel for architectural purposes and for the manufacture of products formerly made of wood has led to the development of a wood veneer which when mounted on steel panels can only be told from wood by rapping the finished product sharply with the knuckles.

Thus, the metal finishing industry is fully prepared to meet the demands of increased industrial activity during 1937. The "bottleneck" will not be here.

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Casting

(*Continued from Page* 308)

installation of much new equipment, particularly for precision control of temperature.

John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., also states that the tendency to include steel castings as parts of

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welded assemblies instead of trying to make the entire job by welding has grown more pronounced during the past year. Considerable attention is being devoted to the development of high-strength low-alloy steels which can be assembled satisfactorily by welding. Foundrymen, says Mr. Hall, are much interested in fundamental studies, here and abroad, of conditions of solidification and cooling in the mold. Much interest also prevails in the introductory use in this country of molding sand mixtures which use cement as a binder. Development of permanent magnets of Alnico is regarded by Mr. Hall as of considerable significance to steel foundrymen since this material cannot be rolled or forged and hence must be cast. Because of the outstanding magnetic characteristics of this material, Mr. Hall believes that it will be cast in large volume.

ENCROACHMENT of steel castings into certain fields normally supplied by metal in other forms further emphasizes the reawakening of confidence in castings, says F. A. Melmoth, vice president, Detroit Steel Casting Co., Detroit, and will doubtless balance losses that must be expected to develop from time to time as a result, for example, of the activities of the fabricating industry. From a technical standpoint the steel casting industry is in fine condition. Mold materials and their effect have been studied and placed under control. Use and abuse of deoxidizers have received careful attention. Much advance has resulted from a greater knowledge of heat treatment and of the remarkable results that can be obtained with low alloy steel castings through heat treatment.

In commenting on the results of researches in the cast iron, steel, copper base and nickel alloy fields, J. W. Bolton, Lunkenheimer Co., Cincinnati, prefers to regard this as foundation material for further progress. A comprehensive correlation of existing data, to be filled in with additional data still to be developed, would result in metallurgical advances far beyond present expectations, he believes.

INCREASING recognition of the relationship between steel and bronze where the two are mated, has brought valuable results, says N. K. B. Patch, Lumen Bearing Co., Buffalo. For a given steel there is a suitable bronze and for a given bronze there is a suitable steel. There has been a marked development in the scientific control of bronze production. The resulting high quality bronzes produce bearings of uniform satisfaction when they are mated with the proper steel. Tests show that bronzes produced under the highest possible precision control operate with less friction and deliver a higher percentage of the load when used as a worm gear. Heat treatment of bronzes is being studied with vigor, says Mr. Patch.

Substitution of zinc die castings, molded plastics and stamped parts for brass, bronze and other copper alloy sand castings has slackened for the reason that most such changes as can be made economically already have been made, according to H. M. St. John, Detroit Lubricator Co., Detroit, in commenting on developments in 1936. Brass die castings continue to make slow progress and appear to have an impressive future, a development which makers of sand castings should study.

So-called silicon-bronzes which, in addition to silicon, usually contain small percentages of manganese or tin, are of increasing importance in the production of sand castings which must be highly resistant to various types of corrosion. Consid-

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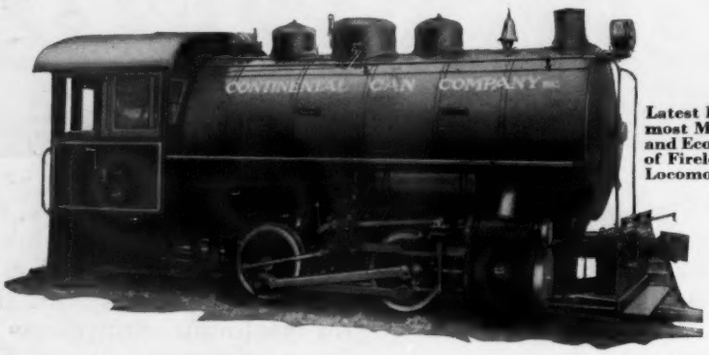

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erable progress has been made with alloys consisting principally of copper with small percentages of beryllium, cobalt and chromium singly or in combination; castings made from these alloys are much stronger than pure copper and retain the high electrical conductivity of copper to a much greater extent than has been the case with other well known copper alloys. Electrical conductivities ranging from 50 to 85 per cent are obtainable in this way in castings which are as strong as or stronger than the conventional tin bronzes and in which physical properties can be still further improved by heat treatment of the precipitation hardening type.

Brass foundries are somewhat slower than the rest of the foundry industry in taking advantage of technical improvements, says Mr. St. John. Most brass foundries, however, now use pyrometers and are more careful than formerly in controlling quality of their metal. In few cases have brass foundries taken advantage of the information obtained in the last few years relative to selection and control of molding sand so that it is interesting to note that the American Foundrymen's association is endeavoring to remedy this deficiency by scheduling a session on this subject at its coming spring meeting.

IN THE equipment field the year's most interesting development, according to F. R. Wallace, Tabor Mfg. Co., Philadelphia, has come as a direct result of an increased demand for special alloy castings from which gates and risers were removed originally at prohibitive cost. This problem has been solved by introducing abrasive cutoff methods to the foundry industry. The effect of this development on the future of these alloys is analogous to the influence of high speed tool steel on the metalworking industry.

Die Castings

(*Continued from Page* 311)

The frame is cast integrally with bearing seats and gear box, reducing the number of parts to be assembled; the size of this casting also compels double feeding.

No new developments have been brought to the aluminum die casting industry during the past year, says Mr. Dix, but the standard alloys covered by specifications of the American Society for Testing Materials were reviewed critically and slightly revised. Regarding dies used in aluminum die casting machines, Mr. Dix states they are made generally from air- or oil-hardening steels. They usually have a life of about 100,000 shots, although some dies have survived 300,000 shots. Failure usually is caused by erosion or heat checking and an improvement in heat resistance of die steel would be a boon to the die casting industry.

IMPROVEMENTS in die casting technique during 1936 have resulted in rapid expansion in the use of magnesium die castings, says Dr. John A. Gann, chief metallurgist, Dow Chemical Co., Midland, Mich. He alludes especially to their large scale adoption by the Hoover Co., Canton, O., which in its new No. 150 vacuum cleaner uses five magnesium die castings, the main casting, bail, fan, chassis and bottom plate. The main casting is the largest and most complicated magnesium die casting so far produced on a commercial basis. With these magnesium castings Hoover Co. has cut the weight of these cleaners by about 2 pounds each.

Production of these magnesium die castings is with plunger type casting machines operating with

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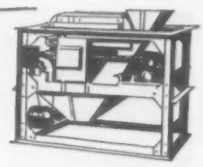
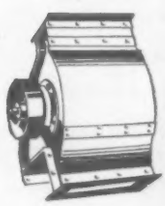
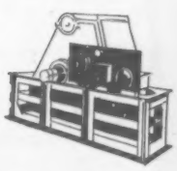
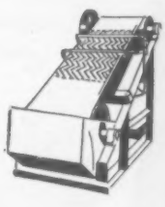
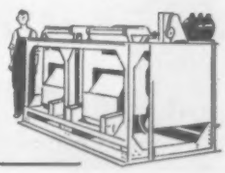






pressures varying between 1000 and 5000 pounds per square inch. This new machine permits the continuous production of sound magnesium die castings with smooth surfaces. It permits the production of more complicated castings with thinner sections and longer fins and webs than were possible with the goose-neck machine.

The grade of magnesium most widely used for die castings, says Dr. Gann, has tensile strength of 28,000 pounds per square inch, yield strength of 21,000 pounds per square inch, elongation of 1 per cent and impact toughness of 1 foot-pound. Present trends indicate that the use of magnesium alloys in the form of castings will increase faster than in the form of wrought shapes, says Dr. Gann.

Machining

(*Continued from Page 277*)

in rates of feed during the period of a working day. In many cases it is necessary to start certain machines an hour earlier in the morning in order to warm them up for use, and in some cases an electric heating unit can be used to advantage. If a fluid can be developed which will not be subject to extreme changes in viscosity, it will undoubtedly help eliminate this condition.

"Hydraulic pumps, especially those of the centrifugal type or of the gear type, seem to be subject to aeration trouble, causing uneven feeds. Electric controls are now being used extensively, but few are really satisfactory. Breakdowns from electric control failures are usually serious as they involve heavy working parts which are not easily replaced. They are caused in most cases by the failure of switches and contactors.

"In the use of electrical controls, the machine tool builders must make strides in the direction of centralization of controls, since in the past too little attention has been paid to the accessibility of this apparatus, and in case of trouble it is difficult to locate the cause.

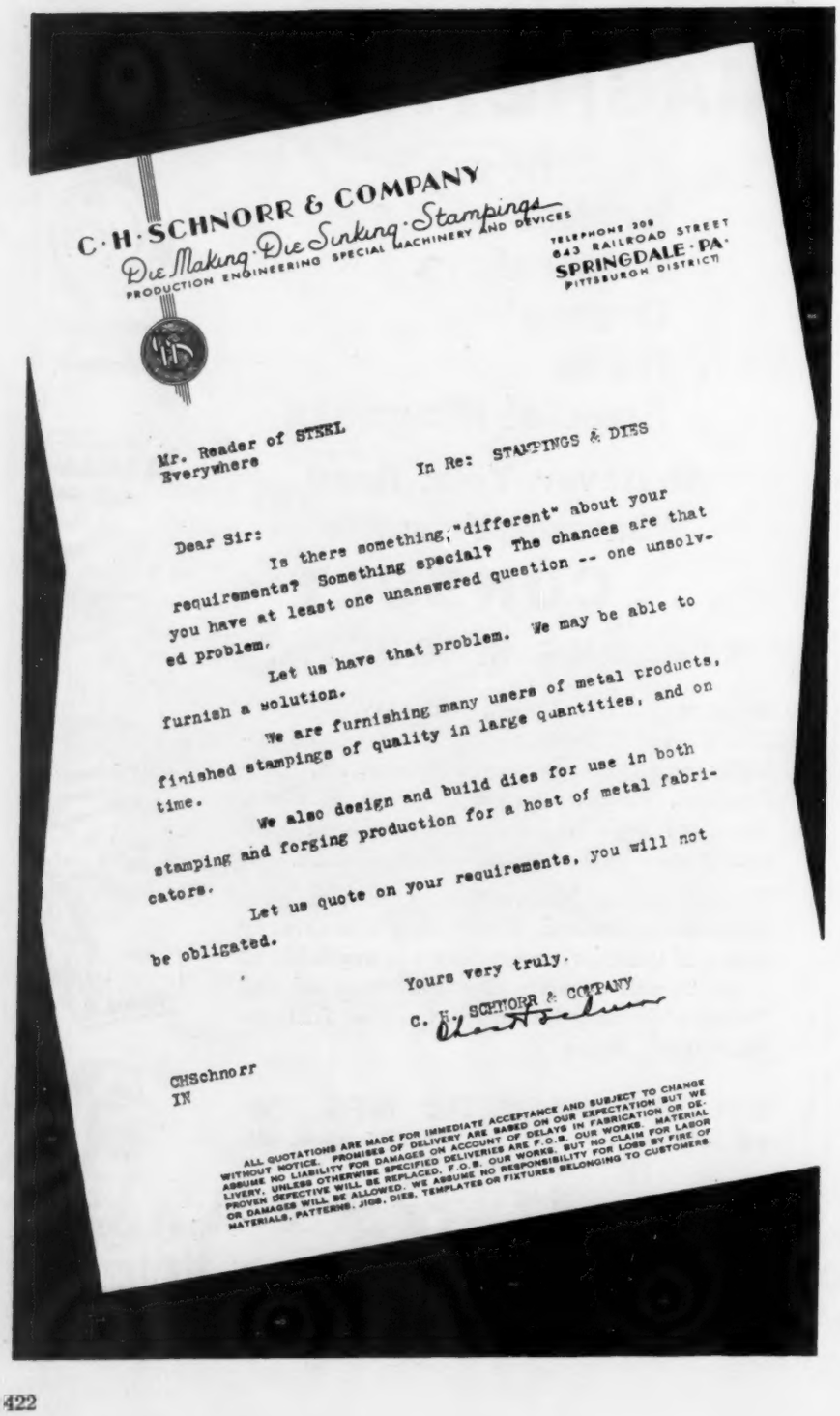
Broaching Gains in Favor

"During the last few years broaching has come to the front rapidly to replace milling, and on some jobs it is satisfactory. Much, however, remains to be done in the future. At present, the major defects we have found are the high cost of tooling, danger of spoiling a costly broach on a chilled spot in a casting and the same danger in an overly hard casting.

"Tungsten carbide boring is proving a useful process both in labor saving and tool saving as well as producing a good quality job. This type boring does not require a skilled operator.

"There has been great development in several kinds of automatic machinery for grinding, turning and the like and an improvement in the automatic operation of milling machines. The basic ideas are good, but they hinge on the dependability of the control systems, which are subject to the weaknesses outlined above. During the past few years it has been demonstrated that the economical way to manufacture is to use the equipment to its fullest extent, many times with three shifts. In this procedure it can be readily appreciated that machine tool performance is of importance in the chain of production.

"Many things can be done by machine tool builders to make their products stand up under rigorous production schedules. Use of a shear pin which will release under severe loads or a clutch which will serve the same purpose would often save costly repair bills. Use of anti-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friction bearings throughout might save frequent stuck bearings. Forced feed lubrication should be used more extensively and vital parts and controls should be made more readily accessible. Hydraulic feed mechanism should be made more reliable from the standpoint of leaks in piping and use of steel tanks."

Labor Shortage Foreseen

Trend toward higher speed is noted particularly by J. S. Chafee, Brown & Sharpe Mfg. Co., Providence, R. I. Electrification of all machine tools is another feature emphasized by Mr. Chafee. "We believe the problem at the present moment giving the greatest concern, however," he says, "is to increase working forces with foremen and operators of good character and ability. In this connection customers and friends have this year expressed more interest in the working of our apprentice system than in the past. We believe the generally increasing interest in training is bound to be of great value to the metal trade industries during the coming years.

"Modernization, in our opinion, can never be carried far enough. All want improved standards of living. Nothing offers more help toward that goal than improved equipment which produces more goods at less cost or superior goods at the same cost.

"In our own experience, the most serious bottleneck in the industry has been the difficulty of obtaining small motors, of the type ordinarily selected by customers at the time of ordering machine tools. It is not at all uncommon for us to have machine tools standing on the shipping floor waiting for delivery on electrical equipment."

Power Drives

(*Continued from Page* 294)

der different service conditions. Therefore, card records are set up on each unit indicating the predetermined frequency.

Each day the inspector takes cards due for that day, inspects the motor and initials the card as O. K. with the date. By giving the card to different men in sequence each checks up on the others. The card carries the number and location of the equipment for ease in identification. This concern even predetermines the frequency of disassembly and overhauling of motors at periods varying from 6 months to 2 years, according to the service and surrounding conditions.

Every servicing, except where performed daily, is governed by a card record and check. Equipment other than motors is controlled in a similar manner. This plan, or some variation, as dictated by shop conditions, is a practical necessity, if service failures or interruptions are to be avoided, for detecting impending trouble and correcting it before a repair or replacement becomes necessary.

Drive equipment planned according to production and operating requirements and systematically inspected, serviced and maintained permit full machine output and prevent practically all but accidental breakdowns. Plants operating under such conditions will be able to meet the requirements of prosperity to the full capacity of the plant, at least as far as the drives are responsible.

Industrial executives are becoming increasingly conscious of the importance of drives and the knowledge that the cost of power is largely a matter of the proper use of it. Much power is wasted between the switchboard and the machine spindle. Methods of reducing this waste are being studied as never before. Much improvement has been accomplished in this application of power economically by better plan-

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ning and organized maintenance; many opportunities exist, however, for further gains.

Forging, Stamping

(*Continued from Page* 279)

creased volume of business generally but to the development of new stamped and formed products. Some of these products include rowboats and speedboats, all or nearly all steel airplanes, trailers, air conditioning units and accessory apparatus, steel houses, beer cans, toys, electric ranges, welded steel bathtubs. Stainless steel is being converted into many new forms.

Notable progress has continued in the development of steel of unusual forming qualities. One of the spectacular setups developed in 1936 was in connection with the forming of an automobile front fender. In this operation steel sheets are stretched from 92½ to 102½ inches in length, a gain of 11 per cent. At one point a 2-inch square section is stretched to 2 9/16 x 2 13/16 inches.

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Steelmaking

(*Continued from Page* 314)

basis of their ability to produce a bottom having minimum porosity and a minimum of objectionable impurities. For those parts immediately under the magnesite and not expected to be in direct contact with metal or slag, more consideration was given to tighter construction. Of the various procedures followed, Mr. Heuer mentions the use of a prepared plastic chrome material designed to develop low porosity when thoroughly burned in. Another was the use of nonshrinking basic brick laid in thick joints of specially prepared mortar.

Increased interest in magnesite nozzles for pouring special heats was apparent. A new type of magnesite nozzle made by the Ritex process was introduced. More mixers were lined with chemically bonded unburned magnesite bricks. Where temperatures are likely to be high these basic linings are decidedly economical.

Sillimanite Roofs Used

Distinct interest was displayed in sillimanite refractories for the roofs of the smaller basic electric furnaces making special alloy steels. These roofs, Mr. Heuer asserts, yield longer life, easier control of slags and less contamination of metal. Sillimanite nozzles also were used with highly satisfactory results. Some of the sillimanite refractories now available have a density as high as 150 pounds per cubic foot.

The diaspore base high alumina refractories have been improved. Shrinkage at high temperatures has been reduced. They are found more economical than silica or clay brick where fluxing by iron oxide slags at medium temperature is a problem.

Superduty clay brick, Mr. Heuer points out in conclusion, generally displaced the high heat duty or first-quality grades in roofs of furnaces heating billets, slags and forgings. Their higher resistance to spalling results in longer life and fewer rejects.

IN COMMENTING on development in the blast furnace industry during 1936, W. A. Haven, vice president, Arthur G. McKee & Co., Cleveland, directs attention to the fact that a sustained and increasing demand for pig iron has for the first time in a decade seriously taxed production facilities and for the moment at least brought a stop, look and listen attitude toward the long continued policy of tearing down idle furnaces. It seems possible that 1936 may have marked the end of this movement.

During the latter half of the year

some of the steel companies' consumers have been definitely short of hot metal and as a result two have contracted for the building of additional stacks. Others probably will follow this course in 1937 and will continue to increase the capacity of existing stacks as they go down for relining. A substantial increase in potential capacity may occur in 1937 for the first time in many years.

For designers and equipment manufacturers this situation has furnished a long awaited opportunity for applying technical improvements, Mr. Haven contends. Practically all programs, for new and rebuilt furnaces, included provisions for "final" gas cleaning equipment, high efficiency stoves and gas burners, modernized filling and charging apparatus, stack temperature pyrometers, clay guns that stop the hole against full pressure, turbine driven blowers, flue dust recovery appliances, and similar improvements.

Innovations Are Now Applied

Numerous innovations whose adoption had been retarded during the depression period are now finding extensive application as means for counteracting the effect of rising wage rates and raw material costs, he asserts. For example, the installed capacity of electric precipitators in 1936 exceeded the total of all previous years. Modern gas cleaning and dust recovery equipment are reducing the loss in metallics to an almost negligible figure. Thousands of tons of flue dust that previously contaminated the air and streams near furnace plants are being reclaimed and ultimately consumed while the air used for blowing the furnaces and the water used for gas washing are being returned to circulation about as free from solid impurities as when taken from their source.

Mr. Haven cites the fact that in operating practices an unusual amount of activity has been stirred up by the insistent demands of foundrymen for clean, uniformly grained pigs, of extremely small range in analysis, and of shape and size that are best suited for their handling and remelting facilities. Whether or not such exacting specifications are justifiable is at least a debatable question, he contends, but the operators have tried to meet them and, although at considerable cost, their efforts have been successful to a surprising extent. Designers are finally coming to the assistance of the operators and a new type of pig machine, brought out during the year, promises to reduce machining costs and to increase casting speeds to a point that will permit the manufacture of "piglets" with a negligible loss of machine capacity.

So far as practice in the furnace itself is concerned the most outstanding results in Mr. Haven's

(*Please turn to Page* 445)

Welding

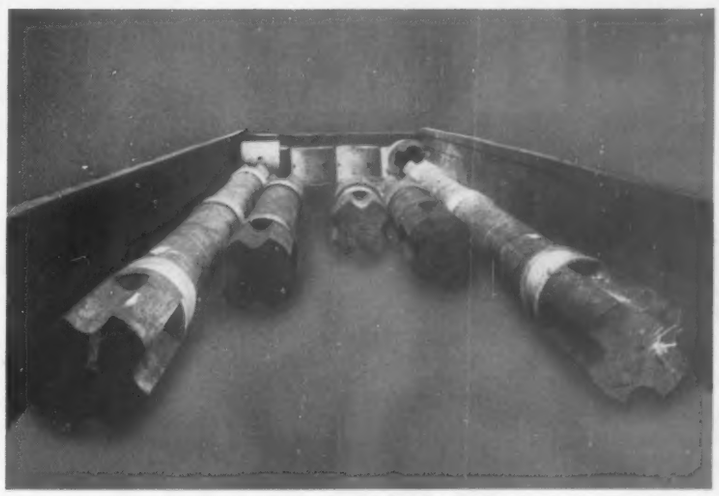
(*Continued from Page* 306)

of almost any size or shape can be produced to close tolerances. In conjunction with this, there is a decided trend toward use of a combination of shape-cut rolled materials and cast parts to obtain greatest efficiency and flexibility in production and design.

The hard facing process, employed originally for reconditioning parts subjected to extreme abrasion, is now being applied to parts which may never in their service life be called upon to resist abrasive wear, but which require resistance to heat, erosion and corrosion. Thus summarize engineers of the Haynes Stellite Co., New York. This means, of course, the hard facing materials have had to be improved to meet these requirements.

Viewing welding from the point

STROH Process Steel



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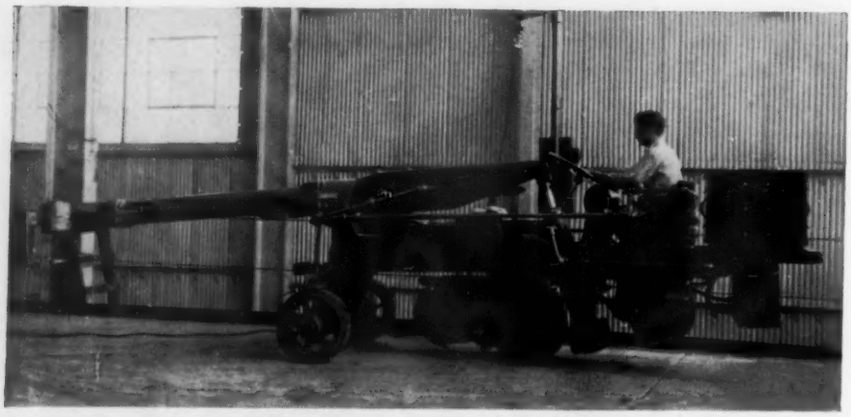
of view of a builder of automobile bodies and lightweight high speed railway cars, J. W. Meadowcroft, assistant works manager, Edward G. Budd Mfg. Co., Philadelphia, emphasizes the importance of portable welding equipment. In the plant with which he is associated, portable welding has about replaced standard spot welding operations because of improved production methods.

Speaking of welding in the aircraft industry, J. B. Johnson, chief material branch, war department, Wright Field, Dayton, O., states that only manufacturers of small transports and sport airplanes are continuing use of fusion welded steel fuselages and control surfaces. Cost of riveting the stressed skin structures, he points out, has led to more intensive study of the possibilities of spot welding, both as applied to corrosion-resisting steel and aluminum alloys.

Fleetwings Corp. recently completed an amphibian in which wing structure and fuselage were fabricated by forming and spot welding 18-8 stainless steel. No such extensive application of spot welding to aluminum alloys has been attempted, although some parts, such as fuel and oil tanks, cowling, flooring, etc., and other low stressed members, have been fabricated with economy. Mr. Johnson declares that development of this type of construction will continue, although it is held back by lack of design and service tests which are needed to convince aeronautical engineers of its reliability.

In spite of aggressive competition of welding, construction by riveting appears to be better than holding its own. Pierre Champion, president, Champion Rivet Co., Cleveland, claims there is nothing new so far as rivet types or raw materials are concerned, but there is a pronounced increase in the use of rivets.

This, believes Mr. Champion, proves that riveting is not being replaced by welding although it may be true in isolated cases. Railroad cars, ships and structural steel buildings are still being riveted, and these in reality constitute 95 per cent of the requirements for rivets. Welding, on the other hand, has more or less made its own field. As he sees it, there is plenty of room for both the rivet manufacturer and the electrode manufacturer without either engaging in cut-throat competition.



THIRTY-EIGHT
Brosius Auto Floor Charging Machines

are in operation. They are self contained and require no tracks or runways. Their movement is not restricted to any definite path and they operate in congested areas as they can be turned on their own wheel base.

The machine shown above is handling 8" x 8" billets, weighing 2000 pounds and the one below is handling 6000-lb. blooms in and out of the heating furnace and delivering them to steam hammers.

Brosius Auto Floor Chargers are built in capacities of from 1 to 6 tons for serving heating furnaces, hammers, presses, mill tables, etc., and for handling charging boxes for serving open hearths, etc. They are also built as a manipulator to handle pieces under a hammer or press.

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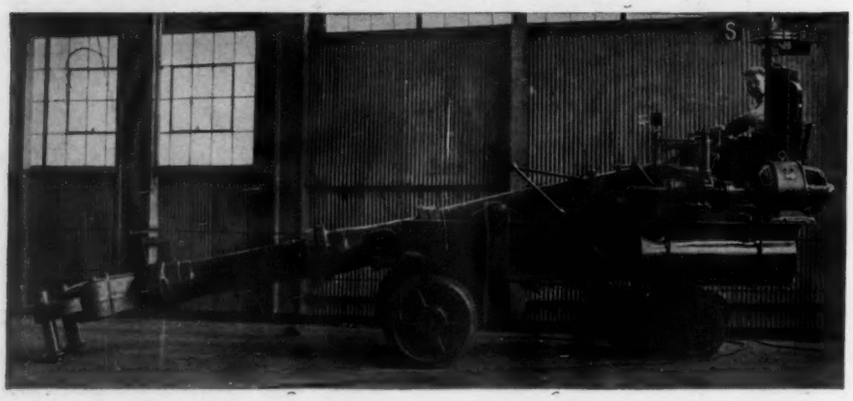

Heat Treating

(*Continued from Page* 274)

for indicating the volume of air and gas, an air-gas mixer for properly mixing air and gas before they enter the processing chamber, a processing chamber, and additional auxiliaries, depending upon the installation. In such equipment, the analysis of the output gas can be varied over a considerable range by varying the ratio between the amount of air and gas entering the processing chamber.

ADDITIONAL furnaces have been installed for bright annealing work, especially in the nonferrous field. H. P. Croft, chief metallurgist, Chase Brass & Copper Co. Inc., Cleveland, points out that these furnaces, with special atmosphere control, eliminate the necessity for removing oxides by subsequent pickling and washing. He also notes an increasing trend toward copper-rich alloys, due to more pressing demands from consumers for corrosion-resisting materials. Age hardening copper alloys are being developed rapidly and are finding a very considerable use in industry, says Mr. Croft.

From the nonferrous production standpoint, Mr. Croft mentions two developments of significance. One is the substitution of low-alloy high-

tensile steels for high-alloy steels in hot working operations, including rod extrusion and tube piercing processes. The second is the use of chromium plate on tools such as drawing dies, plugs and mandrels.

Designers and metallurgists today are required to apply materials at lower factors of safety in the design of equipment which will not result in failure, states O. J. Horger, research engineer, Timken Roller Bearing Co., Canton, O. He observes that the proper use of materials in parts subjected to fatigue action requires a knowledge of the fatigue strength of parts as influenced by the factors of shape, size, sensitivity of the material to stress concentration, and internal damping capacity of the materials used. Dr. Horger claims that despite extensive research too little is known of these factors and much remains to be done.

Greater receptiveness of consumers to improved performance characteristics of special steels impresses H. J. French, in charge of alloy steel and iron development, International Nickel Co. Inc., New York, as a noteworthy aspect of 1936. He believes that "not only has an alloy steel mindedness appeared more generally throughout industry, but the trend has been stimulated from within the steel industry itself through the development of new products." He refers specifically to the rolled and normalized low-alloy steels and the stainless steels, both of these classes of materials having made creditable progress in 1936 in extending applications.

Raw Materials

(*Continued from Page* 321)

taken until 1936 when the Ford Motor Co. let contracts for 122 new ovens. This was followed by Inland Steel Co. with 59 new ovens and the Tennessee Coal, Iron & Railroad Co. with two banks of 73 ovens each. The latter ovens were scarcely started before the end of 1936 and their production will not be available until fairly late this year.

Another illustration of the lack of coke oven construction is found in the figures of the nine years from the beginning of 1928 to the beginning of 1937. At the beginning of this period there were 9604 ovens in connection with iron and steel plants and 3152 ovens at commercial and gas plants, a total of 12,756. At the beginning of this year there were 10,124 iron and steel plant ovens and 3207 commercial and gas, a total of 13,231. This is an increase of 475 ovens in the nine years.

Meanwhile needs of newly-lighted blast furnaces asserted themselves and consumers enlisted the aid of beehive cokemakers, contracts for large monthly tonnages being placed as, one after another, additional blast furnaces were prepared for activity.

Previous to 1936 the highest production of by-product coke was 37,597,664 tons, reached in 1923. In 1932 by-product coke output had fallen to 21,136,842 tons. From this low mark coke production has grown steadily until 1935 gave a total of 34,224,153 tons, which was only 3,373,611 tons under the maximum previous annual output.

Statistics of the bureau of mines show production of 32,036,691 tons of by-product coke for nine months. At the same rate for the remaining quarter 1936 should show total production of more than 42,000,000 tons, sufficiently above the high mark of 1923 to bear out the assumption that practical capacity of by-product ovens has been reached.

In 1923 beehive coke production had fallen from a leading position to 19,000,000 tons and in the trough of the depression, in 1932, it was down to 651,888 tons, recovering to 917,208 tons in 1935. Indeed, so low had beehive cokemaking fallen that

the *Connellsville Courier*, Connellsville, Pa., after 55 years of service in publishing production statistics of the Connellsville region, ceased this publication in January, 1936. The nadir had been reached in the week of Sept. 21, 1935, with 2420 tons.

However, with pressure for more coke than by-product ovens could supply the beehive industry shortly after the middle of 1936 found the market avid for its output. Early in the year 5000 to 6000 tons per week were being produced but by October this had been increased to 150,000 tons or more per month. Where in all of 1935 beehive production had reached a total of 917,200 tons, ten months of 1936 had brought a total of 1,312,100 tons and the promise that the remaining two months would bring this figure to about 1,800,000 tons. This does not tell the full story, however, for practically all of this gain over 1935 has taken place in the final quarter of 1936 and with equal demand and increasing output during 1937 the beehive output will mount to something approaching former levels.

Meanwhile the same factors that caused a shift from beehive to by-product coke in the past doubtless will continue to operate and while the facilities for beehive production may be utilized as a stopgap in time of need steelmakers doubtless will continue to provide by-product ovens for the more economical carbonization of coal in preference to the relatively wasteful beehive production method.

Importance of coke in the cycle of steelmaking is paramount as it enters at the beginning, with iron ore and limestone, in the blast furnace, to reduce the ore and produce pig iron, which is the raw material for steel production. Without coke in sufficient quantities to make the tonnage of pig iron needed to meet steel demand the entire industry is slowed.

Inasmuch as construction of by-product ovens is relatively a slow process, as well as costly, it seems likely that even with sustained demand for steel it will be some time before by-products ovens will be provided in sufficient number to meet a peak demand and reliance will be placed on beehive coke to fill the gap until needs again recede to the ability of by-product plants to meet it, or the latter are increased sufficiently to render beehive assistance no longer necessary to tide over the peaks.

Ferroalloys Plentiful

Ferroalloys constitute a minor, though important, raw material for the steel industry and apparently no difficulty is encountered in providing an ample supply at home as need arises. However, in spite of domestic facilities a considerable tonnage is imported.

The most important ferroalloy in point of tonnage is ferromanganese, with its companion, spiegeleisen. These are for the most part products of the blast furnace, though some production is by electric furnace. In the flush year of 1929 when demand for steel was heavy, domestic production of these two totaled 459,893 tons, declining to 356,995 tons in 1930 and falling to a low of 97,345 tons in 1932. The recovery from this low has been steady, with 283,897 tons made in 1935 and 357,849 tons in eleven months of 1936. This brings the rate fairly close to that of 1929.

Other ferroalloys, including ferrophosphorus, ferrotungsten and others have ranged between 3000 and 6000 tons per year over several years and in eleven months of 1936 reached 8879 tons, indicating increased call for these alloying elements in special steels.

In addition to domestic production of ferromanganese and spiegeleisen 1935 saw imports of 54,007 tons and ten months of 1936 brought

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1892 *Let Us Quote* 1937

57,376 tons from foreign producers.

These figures indicate entire readiness of the steel industry to provide its full needs in ferroalloys for whatever height general steel demand may reach. The proportion of imported alloys is so small that should they be cut off by foreign wars or other causes it would not be difficult to meet the deficiency by slightly increased domestic effort.

Materials Handling

(*Concluded from Page* 287)

materials from bins to overhead charging cranes.

Truck and trailer manufacturers are continually meeting demand for heavier and special equipment. A new 30,000-pound pneumatic-tired trailer was designed recently by Easton Car & Construction Co., Easton, Pa. Included among other new items in this company's line were a hopper bottom hand truck of 27-cubic feet capacity, equipped with Fairbanks scale and four swivel castered rubber tired wheels; also a rapid-dump lift truck body of 27-cubic foot capacity with caster wheels and a rapid-dump trailer of similar capacity with pneumatic tired wheels.

One of the recent Standard Conveyor Co., innovations is a new full powered radial switch, for which patent application has been made. This is to permit intermediate discharge of commodities at any one or at numerous points without manual attention other than pressing of a push button. There are many commodities, the nature of which prevents ready diverting from power belt or slat conveyors. The new switch is said to overcome such difficulties. The rollers are power driven and the arrangement makes possible the application of power to all rollers regardless of the position of the switch; that is, the rollers are positively driven whether the switch is in position for straight ahead travel or in a position for discharge to a lateral line.

NEW developments in the future are likely to be in the direction of greater refinement of equipment design rather than in revolutionary new machines. The future also holds possibility of linking together in continuous operation such departments as at present are operating separately. This is said to be more true in the tin plate industry than in some others since possibilities have been conceived of plating strip and shearing same to can sizes after the lithographing has been completed, eliminating considerable handling between departments.

THE KEYSTONE OF MODERN STEEL PRODUCTION

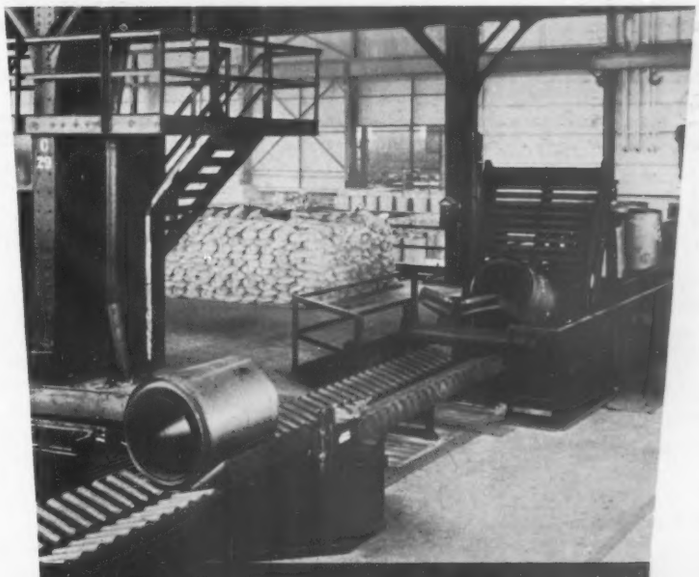
CONTINUOUS is the big word of the Steel Industry today. Steel men know that long before the continuous strip mill came into the limelight the ideal of Continuous Flow production was a fixed objective of the industry, dating back to the invention of the open-hearth process.

So it is natural that Mathews Conveying Equipment, developed originally for all Industry, has for more than 30 years embodied the Continuous Flow Principle. Mathews engineers, from the very first, saw that material handling in the Steel Industry was the keystone of the production process.

Mathews Conveyers include Belt, Live Roller, Drag Chain, Roller Chain, Pallet, Continuous Apron, Wheel and Roller Conveyers. Also Vertical and Inclined Elevating Conveyers, special devices for up-ending, down-ending, tilting and transferring, for the handling of Hot and Cold Billets, Bars, Shapes, Sheets, Packs, Coiled Steel, Pipe, Tubing in continuous flow processes.

The leaders in this industry, responsible for 85% of steel production in the United States, are applying the Continuous Flow Principle of Handling Materials with Mathews Conveyers.

MATHEWS CONVEYER COMPANY 142 TENTH STREET ELLWOOD CITY, PENNA.



MATHEWS

CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS

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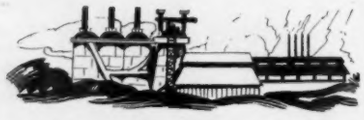

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Taylor Sees Sound Revival

THE most satisfactory feature of the improvement in 1936 was the steady advancement throughout the year, and it is particularly noteworthy that the political contest exerted no retarding effect on business expansion," said Myron C. Taylor, chairman, United States Steel Corp., in a year-end summary. "This and other significant factors point to a revival predicated upon sound economic principles and actuated by an urgent need for steel.

"The year 1936 saw the beginning of a large program of betterments, involving expenditure of several hundred million dollars. This program contemplates the provision of production facilities necessitated by changes in mechanical appliances and to supply products of a character demanded by the trade, and for general maintenance of larger proportions arising from deterioration and deferment during the depression period.

Full Production a Factor

"Completion of these rehabilitation plans, entailing financial investments, will bring into being more efficient and economical units of production, when engaged under satisfactory operating conditions. Modernized facilities, to function with a maximum of effectiveness, must of necessity be kept employed at a level approaching full capacity. To the extent that a continuous flow of business in good volume is not assured, it is unreasonable to expect that such facilities can adequately function for the creation of wealth for the public, who are the owners, or to provide the largest measure of employment for those who are engaged in their operation.

"General commodity price levels have shown an unmistakable upward trend recently. Resultant increased material costs, heavier tax levels and an average 10 per cent increase in steel wage rates recently granted have substantially added to production costs. As a consequence it has been necessary to announce moderate price advances in some lines of steel products to become effective on first quarter business for 1937. It is to be observed, however, that these price increases do not apply on all lines of steel manufactures and will not fully offset the increased costs resulting from higher wages, cost of materials and taxes.

"The steel industry enters upon the new year with greater confidence than it has in any year since 1930 and with every indication that it will be a better year than 1936

★

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(CHEMICAL VAPOR SPRAY CLEANER)

To speed repairs, clean first! For safety and sanitation; for cleaning windows, floors, machinery, walls, etc. by the economical vapor-spray method.

More information about any of the above products on request

HOMESTEAD
VALVE MFG. CO.
CORAOPOLIS, PA.

44 Years of Service to Industry

has been. New business booked by steel mills in the last quarter of 1936 has been in most encouraging volume and is sufficient to enable us to start 1937 in fine fashion. Especially gratifying at the moment are the increasing evidences from the field of railroad transportation that the long pent-up requirements are in substantial measure about to be satisfied.

"We have emerged from the long and difficult battle with adversity during the past six years with our courage, strength of character and resources intact, and we may take a pardonable satisfaction in having weathered the storm with our colors flying. The steel industry cooperated wholeheartedly during those trying years in every sound effort to re-establish the pace of prosperity and to develop and maintain a fair and sympathetic relationship with its workers. As evidence of its sincerity in carrying out this policy, it is to be observed that the steel industry today is giving employment to more men than at any time in its history and its basic rate of pay is at a higher level than ever paid before.

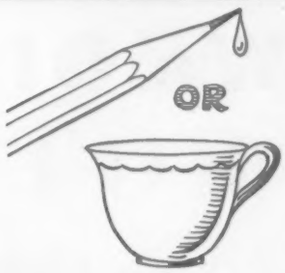
"If we will bring into full play our greatest effort and skill, our vast resources and our constructive ingenuity, submerging self-interest to the interest of the whole nation, we have it within our means to establish an economic and social balance of enduring quality."

"Construction To Gain in 1937"

THE year 1936 was significant in that it marked the first great improvement from the depression low in the structural steel fabricating industry," said V. G. Iden, secretary, American Institute of Steel Construction.

There had been an increase of some 25 per cent in volume in 1934, but a drop of 2 per cent in 1935 over the previous year. Until 1936 the upturn in business from the depression low has been slow but consistent. In 1936 this industry did a volume of business that was 40 per cent greater than in 1935. Coincidently there is a renewed sense of the possibilities of structural steel and a confident expectation that the increase in business will not only continue but will advance some 15 per cent more during the coming year.

"During 1936 the industry fabricated and shipped approximately 1,500,000 tons of steel. During 1929 it fabricated and shipped more than 3,300,000 tons. While there is seeming satisfaction in the improvement



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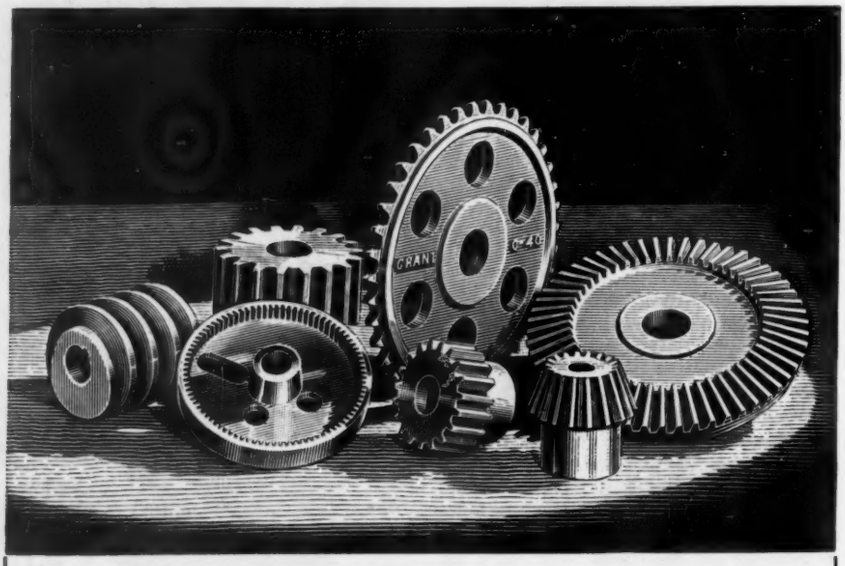

IF it's a special gear, we'll make it for you quickly and correctly. If it's a stock gear, we'll send it at once from our large reserve.

SIXTIETH GRANT YEAR 1877 1937

GRANT GEAR WORKS—Boston

already noted, it is obvious that the normal level of the industry has by no means been reached, and it is towards that normal that the industry is now directed.

"As a general thing the steel sold by this industry has gone probably one half in bridges and the other half in buildings and other structures. The program of grade crossing elimination that was started last year is now approximately only half contracted for. There should be a continuation of that work in undiminished volume. Also, there will probably be no diminution in the volume of bridges to be built during the next year or two.

"The act of 1935 appropriated $200,000,000 for the elimination of grade crossings. On Oct. 31, 1936 a total of $195,000,000 of this had been apportioned. Projects involving $113,915,136 are under construction. Projects approved but not started involve $24,185,076. In addition to the balance of $34,136,782 available for additional projects under that appropriation, congress has approved an expenditure of $50,000,000 each year for grade crossing eliminations in the next two annual federal highway appropriations. These appropriations are all in addition to the regular highway work that will include the usual amount of bridge building.

Express Highways Coming

"The states and cities are today better able financially to undertake their own highway work. They will be expected to take up soon the building of many express highways through and over congested centers. Elevated highways are being constructed in New York and are planned for such cities as Detroit, Chicago, St. Louis, Baltimore, Boston and other centers. Such highways lift traffic off congested streets and make the cities more easily accessible to visitors from rural areas. They are daily becoming more necessary to modern transportation needs, and they are proving their necessity by experience already had with roads which have attempted to by-pass traffic around congested centers.

"Another increase in the volume of business, equal to the increase in 1936, 40 per cent, cannot be expected in 1937, as the market is definitely taking on a new complexion. That is manifested in rising costs, sustained demand, higher rates of mill activity, shortening inventories at the source, delayed deliveries, shortages of skilled labor, labor unrest. These things are likely to put a brake upon the volume of recovery in 1937, but the hopeful sign above all others is that the volume will continue to show a satisfactory increase."

Trundle Warns of Runaway Prices

WHILE present indications point toward continuing steady upswing of business in 1937, there are some elements in the present picture which threaten this possibility," said George T. Trundle Jr., president, Trundle Engineering Co., Cleveland.

"Foremost among the latter is the danger of runaway prices. If prices of the things which people want to buy advance more rapidly than the incomes of the people who want to buy them, much of the progress which we have made toward recovery will be lost.

"Our whole industrial system in this country is based upon mass purchasing power. It is absolutely necessary to preserve and to enlarge mass buying power if we are to realize the benefits of the principles of mass production and distribution upon which the American plan of doing business has been founded.

"It is my belief that one of the most important steps to insure continued prosperity in 1937 is to make sure that all employes secure a wage which will enable them to purchase many things in addition to the bare necessities. I am in favor of an advance in basic rates of pay throughout the country. This advancement is made imperative because of the increase in the cost of food, clothes and rent. People who can buy these things and nothing more are literally taken out of the market for thousands of products upon which American business depends for a major share of its activities.

Keep Wages Up; Prices Down

"Only by maintaining a liberal margin between wages paid and the prices of things that people want can we assure a continuing broad market for most of the things which business has to sell. We have long since passed the stage in this country when business can function merely by supplying the necessities of existence. To keep business going full steam ahead, we need constantly more people who have enough money left over, after they have paid for necessities, to buy refrigerators, washing machines, furniture, automobiles, radios and the countless other devices which today account for the major share of our manufacturing operations.

"The sure path toward industrial profits is to keep wages up and prices down. The automobile and rubber industries have long since proved this fact. They have paid high wages and they have kept the prices of their products down, thereby gaining enormous volume,

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and securing profits because of the manufacturing economies made possible by volume, plus efficiency of management.

"Another trend which may threaten business recovery is the current tendency toward over-extension of consumer credit. Too many products are being sold to families on a long-term basis. If we sew up the total incomes of thousands of people for two or three years ahead, on commitments made today, we have anticipated their buying power and taken them out of the market for the products of tomorrow. If there should come a lull in business, thousands of people would be caught without the capacity to pay, and merchants and manufacturers who had sold them on a long-term basis would find themselves with a flood of returned merchandise on their hands.

"In addition to keeping consumer prices down, keeping wages up, and using reasonable common sense in extending credit, industry must assume a greater degree of responsibility for training men if it is to make a satisfactory advance in 1937. Unless this is done, the next year or two may see one of the greatest shortages of labor in American history. Today there are nowhere near enough trained men to do the work which needs to be done.

"No one else is going to train men for industry. Classroom education will not take the place of shop practice. Industry must begin to take new men into its plants, and put up for a while with their blunders and mistakes. Of course there is a price to be paid for training men; but the price will be nowhere near as high as will have to be paid if industry does not assume its responsibility."

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Canada's 1936 Steel Output Comes Close to Best Record

Production of steel and iron in Canada for 1936 showed marked improvement over any previous year since 1930 and in steel ingots and ferroalloys was only slightly behind the record years of 1928 and 1929.

The improvement was due to the carryover of railroad contracts for rail, track materials and rolling stock from 1935 and also to general betterment in other branches of industry which had direct bearing on all raw materials. Mining, automotive and agricultural implement industries played important parts in strengthening demand for iron and steel and their products, and there was more pronounced activity in export markets.

As 1936 ended new business of a substantial nature appeared in the Canadian markets both from domestic and foreign sources which left the impression that a strong market would continue well into the current year. The following table shows production figures of iron and steel in gross tons from 1923 to 1936, inclusive:

	Pig Iron	Steel Ingots	Steel Castings
1923	880,018	939,710	45,060
1924	593,024	625,175	25,515
1925	570,397	733,855	18,840
1926	737,503	745,550	33,338
1927	707,697	867,928	39,710
1928	1,037,727	1,190,001	44,718
1929	1,090,244	1,309,543	70,145
1930	747,178	957,430	54,313
1931	420,038	664,826	37,055
1932	144,130	312,360	22,915
1933	227,315	394,059	15,920
1934	406,955	738,430	20,640
1935	599,794	904,180	31,502
1936*	660,830	1,075,660	32,930

* December production figures estimated.

"Youth in the Saddle"

Youth is in the saddle for one of the major steel companies of the St. Louis district. Forty-six years is the average age of the six chief executives of the Granite City Steel Co., a survey conducted within the company disclosed. The oldest executive is 53 and the youngest 43.

The age of youth is even more

pronounced in the company's sales department. District sales managers and the salesmen working under them have an average age of 39.9 years. Oldest in this department is 59; youngest 25.

Use of Tin Grows; Russia Leads Gain

ACCORDING to the December issue of The Hague statistical bulletin of the International Tin Research & Development Council apparent world consumption of tin in the twelve months ended October, 1936, totaled 153,709 tons, showing an increase of 13,925 tons over the total for the preceding twelve months, while world production increased by 36,200 tons to 167,000 tons.

Although production of tin has exceeded consumption by about 13,300 tons during the year ended October, 1936, world visible stocks have increased by only 3130 tons in that period. This discrepancy is partly due to the time lag which occurs between export of ore from the producing areas and appearance of the metal on the market, but it also indicates that there was an increase in smelters' stocks which had not appeared in the statistics up to the end of October. In November, 1936, world visible stocks of tin increased by 4162 tons to 22,137 tons. These stocks now represent 14.5 per cent of the current annual rate of consumption compared with an average ratio of 11 per cent in the first ten months of this year.

Tin Plate Boosts Demand

The increase in tin consumption this year has been largely due to the tin plate industry, in which there has been an increase of 17.7 per cent. In the year ended October the world output of tin plate reached a new record of 3,630,000 tons, against 3,083,000 tons in the previous year. There was also an appreciable advance in the motor industry, the world output in the year ended October, 1936, being 5,650,000 vehicles, compared with 4,509,000 vehicles in the previous twelve months.

Considering the consumption of tin by countries, in the United States there was an increase of 12,209 tons in the year ended October, 1936, compared with the preceding year; the United Kingdom consumption was 21,512 tons, which represents a slight decrease, 369 tons; Russian consumption continues to increase at a rapid rate, a new record of 9227 tons having been reached in the year under review, representing an increase of 33.4 per cent.

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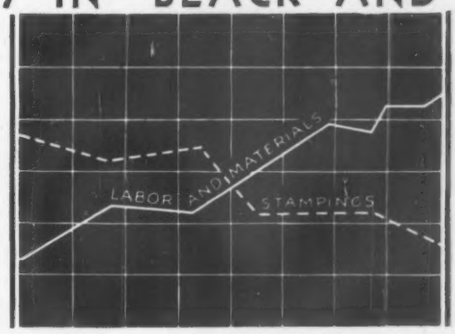

MOUNTING costs in both labor and materials are in part, responsible to the manufacturer's consistent switch to steel stampings. Not only have stampings proved themselves economically correct, but they have become more practical in application.

To justify this lower stamping cost, your product must be studied by men thoroughly skilled in stamping practice and backed by a plant modernly equipped with presses of great productive range . . . These are *your* facilities at Parish and Parish welcomes *your* blue-prints and specifications.

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Lincoln Foundation Established To Promote Arc Welding

SPURRED by a dual desire to stimulate scientific development in the arc welding field, and to honor the pioneer work of its president in promoting arc welding and perfecting and developing arc welding equipment and electrodes, Lincoln Electric Co., Cleveland, has just completed plans for establishing a fund and foundation to encourage study and research for benefit of the industry.

This new fund, voted by directors of the company at the turn of the year, has been named "The James F. Lincoln Arc Welding Foundation". Objects of the foundation, and the significance of its name, are set forth in the inaugurating resolution just adopted by the company's board. This states in part:

"Whereas, it is desired in the public interest that careful and extensive scientific study, research and education in respect of development of the arc welding industry be encouraged; and

"Whereas, the comparatively recent developments of electric arc welding disclose a vast field of study and research which yet is in its infancy. . . . ; and

"Whereas, through such study and research, the public and modern industry should have the benefit of accurate knowledge and information in matters affecting the application of electric arc welding to machinery and equipment; and

"Whereas, it is the desire of this company to assist in furthering said objects and to provide suitable rewards, therefore;

"Be it resolved that the Lincoln Electric Co. should, and it does hereby, found, create and establish for such purpose, a scientific educational fund and foundation, which shall be organized and operated exclusively for the purposes as set forth in this resolution; and further, as a token of its esteem and respect for James F. Lincoln, and for his wide experience and interest in said scientific subjects, it denominates such as 'The James F. Lincoln Arc Welding Foundation'."

Directors Are Named

Principal direction of the foundation's work will be given by Dr. E. E. Dreese, chairman, department of electrical engineering, Ohio state university, Columbus.

Other trustees who will serve with Dr. Dreese on the foundation are W. B. Stewart member of the Cleveland bar, and H. R. Harris, vice president, Central United bank of Cleveland.

Acceptance by Dr. Dreese assures the carrying out of studies which will view arc welding with full regard to both its economic and social significance.

After receiving the second electrical engineering doctorate degree ever given by the University of Michigan, in 1929. Dr. Dreese was appointed professor of electrical engineering at Ohio State, and in February 1930, was made chairman of the department.

He is the author of numerous papers before the American Institute of Electrical Engineers, of which he is a member. He is a member of the Society for Promotion of Engineering Education, and Tau Beta Pi, Sigma Xi and Eta Kappa Nu honorary fraternities

"The world is just becoming aware of the rise of a new industrial process which holds economic and

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For over 40 years we have been continuously at work fabricating steel construction. During that time we have enjoyed the complete confidence of many nationally known concerns. We have shipped steel to all parts of the United States and abroad. To a great many of our customers we have been a branch factory, taking care of their requirements as would their own plant.

The fabrication of structural steel is our only business. We have no specialties to sell and we are not looking for any. Your work will be treated with the greatest confidence.

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social significance of the highest order", said Mr. Lincoln.

"In laboratory and in mill and factory the world around, scientists and technicians are seeking to develop new phases of the electric arc as a superior welding technic.

"Already, their persistent pioneering has brought forth amazing results. With the aid of the electric arc, many industrial methods, together with new processes of incalculable benefit have been made commonly available.

"Yet, so recent is the development of arc welding as a practical process, its full benefits have been experienced by not more than one in five potential users.

"It is indisputably a fact that every manufacturer, every engineer, every merchant and every consumer of virtually every product now made has a vital interest in further development of the arc welding process—in speeding the widest possible acceptance of this comparatively new method which produces so much better for so much less.

"The sole purpose of this new foundation is to challenge the attention of manufacturers whose products benefit society; and to stimulate the ingenuity of every engineer and skilled worker interested in extending the frontiers of knowledge and achievement.

"This arousing of interest through the foundation will result, I believe, in lower production costs for thousands of devices and commodities now employed in manufacture or moving in commerce, and will give constantly increasing markets the benefit of better, stronger and more serviceable goods."

Activities of the foundation, it is said, will not conflict with research or promotion now carried on by other groups interested in arc welding; also, that the foundation will have no relation to the commercial activities of the Lincoln or any other arc welding firm.

Per Capita Debt $416

Per capita debt in the United States, taking into account not only the debt of the federal government but also that of the various political subdivisions, totaled approximately $416 as of June 30, 1936. This compares with a total per capita debt of approximately $1016 in the United Kingdom at the close of the fiscal year 1935.

The National Industrial Conference board reports that the total public debt of the United States June 30 amounted to an estimated $53,400 million. On March 1, 1935, the latest date for which complete figures are available, the total public debt of the United Kingdom amounted to £9,491 million, or approximately $47,455 million.

12.6 Per Cent of Steel Capacity in Northeast

Northeastern United States has held a major rank as an iron and steel producing district for nearly 300 years, and today in 79 communities of that region there are 110 separate plants where steel and iron products are made, according to the American Iron and Steel institute.

More than 72,000 employes are at work in the district. Current payrolls of the plant are about $9,000,000 per month. The definition of the eastern district includes the New England states, and that part of the country north of Virginia and east of a line drawn north and south through Altoona, Pa.; Marion and Harris counties in West Virginia, and that part of Maryland west of the north-south line.

Steel ingot capacity in the district is in excess of 8,700,000 gross tons of ingots per year, 12.6 per cent of the country's total. Only the Pittsburgh and Chicago areas can produce a greater annual tonnage.

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Continued Improvement Is Expected by Swope

"At this time last year we stated we expected a continued improvement in business for 1936, but the outlook was not particularly good for capital goods in the public utility and transportation fields; this has been borne out," said Gerard Swope, president, General Electric Co.

"The public utilities have followed in 1936, as in previous years, the policy of giving the consumer the benefit of lower rates. As a result the use of electricity has continued to increase so that in 1936 we had the largest consumption of electric energy ever reached in this country. The people of the United States now use over four times as much electric power per capita as the rest of the world.

"For 1937 we look forward to a continuance of improvement in business. As the increased use of electric energy continues, of course, there will be a decrease in the margin of surplus generating capacity, which is so essential to the rendering of good service to the public. Hence it will be necessary for the utilities to increase their plants, with a consequent expansion in orders for heavy goods, which are so much needed in our shops and to restore general employment in capital goods industries."

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41 years experience in building tube mills.

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Electrical Industry's Prospects Are Bright

"Prospects for the electrical manufacturing industry are very bright," said A. W. Robertson, chairman, Westinghouse Electric & Mfg. Co.

"Practically all divisions are operating at capacity and orders in sufficient volume are coming to warrant an optimistic view for the next several months. Incoming business is not confined to any one type of product. The demand for household goods is excellent and the public utilities and industry generally are making substantial purchases.

"Notwithstanding many threatening, unpredictable contingencies there is evidence that we are moving along a more or less typical American business curve. The upward swing may continue for considerable time.

"It is now the problem of industry, government and individuals to make certain that the present improvement will be maintained, to the end that business conditions in the future will not be subject to the violent, disastrous fluctuations experienced in the past."

Transportation Field Encouraging, Says Budd

Edward G. Budd, president, Edward G. Budd Mfg. Co., makers of light-weight stainless steel trains and all-steel automobile bodies, said that the public demand for new modes of transportation, taken in conjunction with the growing ability of the railroads to meet it, provides one of the most encouraging signs for 1937.

"For the first time in many years, the continuing prosperity of the railroads of the country makes it possible for them to plan and execute long-delayed improvements on an increasingly large scale," he said. "There is every indication that the new year may be expected to bring about a continuance of this upward trend.

"Marching hand in hand with widespread improvements in profitable passenger service is the increase in car loadings and freight movements everywhere. One of the fundamental indices of general pros-

perity, this increase and its ratio to passenger traffic today possesses a new significance, and cannot be attributed to seasonal fluctuations alone. It has the aspect of something permanent when linked with the railroads' modernization programs throughout the country."

Cites Broader Markets for Air Conditioning in 1936

Marked broadening of the applications of air conditioning, resulting in much wider markets, plus collection for the first time of data showing the effects of air conditioning on commercial establishments of many kinds, are two outstanding achievements of 1936 in this industry, according to J. J. Donovan, manager, air conditioning department, General Electric Co.

"First adopted in homes, offices, and public meeting places like theaters, air conditioning has now demonstrated its value in innumerable other places," Mr. Donovan states. "To name one or two, many installations in hospitals have been made during 1936, in order to reduce the high mortality in hot weather, to improve post-operative care, to assist in treatment of respiratory diseases, and to provide better conditions in operating rooms. Again, a number of newspaper offices have found that air conditioning their printing rooms has improved the quality of their printing and the handling of paper and ink. Other applications of interest have been made in department stores, banks, hotels, and broadcasting stations.

"For the first time, prolonged studies of actual experience have shown that air conditioning steps up the business of retail shops by 17 to 43.25 per cent and of restaurants by 21 to 41 per cent. The same studies, which could not be made prior to 1936 because there was insufficient background of experience, show that proper interior climate results in saving in handling and insures uniform quality of raw materials throughout many types of manufacturing plants."

Best Year Since 1929 for Metal Lath Manufacturers

Metal Lath Manufacturers association, Chicago, estimated last week that its members' 1936 volume of business was larger than for any year since 1929.

"With the long record of successful promotion of metal lath the manufacturers have a background of experience and are planning to resume the active promotion of metal lath on a larger scale than has prevailed in the last three or four years," said the association.

"Recently the manufacturers adopted a new simplification so as to reduce the number of varieties of metal lath which had to be carried in stock by dealers and in consequence also reduced their own inventories to those types of lath which had been found to be in greatest demand by the trade.

"The manufacturers have recently renewed their membership in a number of leading national organizations, such as the American Standards association, the Pacific Coast Building Officials conference, National Housing Advisory council and others in which in former years they had been active in developing standards and fire retardent construction.

"It has been interesting to note that in spite of the slightly greater cost of metal lath than some of the cheaper but less durable plastering bases, it is being used in considerable volume in small dwellings. In many of the larger dwellings metal lath is used as a plaster base

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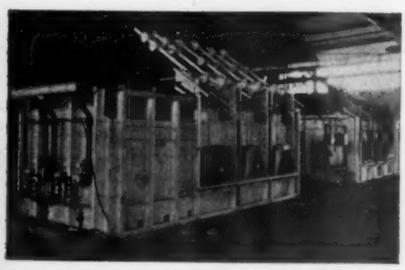

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throughout not only for its reduction of upkeep cost, due to its elimination of plaster cracks, but also because of the greatly added measure of fire resistance."

Buys $300,000 Equipment

Timken Roller Bearing Co., Canton, O., has placed orders totaling $300,000 with various machine tool builders for new machinery and tools to increase its capacity to produce bearings for locomotives and rolling stock.

Hadfield Donates Oxford Picture

TYPICAL of the friendly feelings existing between the steelmakers of Great Britain and America is the gesture by Sir Robert A. Hadfield, chairman, Hadfield's Ltd., of Sheffield, in offering a picture of Oxford to Harvard university on the occasion of its tercentenary. The picture, 40 x 26 inches, is a water color by Herbert J. Finn.

In a letter which Sir Robert wrote to Dr. James B. Conant, president of Harvard, in which the writer expresses his pleasure at the acceptance of his gift by the board of the university, Sir Robert states that he has often wished to show some mark of respect and admiration to the center of learning in America, including the Harvard engineering school, which has its faculty of metallurgy and metallography—and also the Massachusetts Institute of Technology, founded in 1861.

He refers to Prof. Albert Sauveur —who informed him of the acceptance of the gift by the board— and mentions that Prof. Sauveur was the recipient in 1924 of the Bessemer gold medal of the British Iron and Steel institute, and that he, Sir Robert, was one of those who proposed him for that honor. Reference also is made to the late Prof. H. M. Howe, who was another of Sir Robert's friends.

Sir Robert Hadfield, who is known the world over as the inventor of manganese steel and silicon steel, is a foreign associate of the National Academy of Science, Washington; a recipient of the John Fritz gold medal of the United Engineering societies in 1921 (this medal has only been awarded to two other Englishmen—the late Lord Kelvin and the late Sir William White); the Elliott-Cresson gold medal of the Franklin institute in 1910, and an honorary member of the American Institute of Mining and Metallurgical Engineers. He is probably the only Englishman who possesses these privileges.

Dr. James B. Conant, president, Harvard university, was recently in England, where the University of Oxford conferred upon him the honorary degree of D.C.L.

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Rolled from Standard Bar Stock

FLATS
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Predicts Sale of 420,000 Electric Ranges in 1937

Production of electric ranges in 1936 showed one of the greatest increases of all electric appliances in 1936, according to Reese Mills, manager, range and water heater department, Westinghouse Electric & Mfg. Co.

"This appliance," said Mr. Mills, "has accomplished the astonishing feat of multiplying sales six times in the last three years, and the future holds even greater promise.

"Over 300,000 will be sold in 1936. I believe that 1937 sales will be around 420,000—constantly increasing thereafter. Sales in 1940 will probably be very close to 1,000,000 units. This statement might appear to be optimistic at first, but we should consider several conditions existing today.

"There is a tremendous replace-

ment market looming on the range sales horizon. There are many stoves still being used today that should have been replaced years ago. There has been a more widespread solution to the problems of installation cost and factors that in the past have been responsible for slow sales in many communities. To my mind, however, the most favorable factor is that the country is becoming more electric minded. This is making it easier to sell electric ranges, which in turn results in retailers becoming more interested in selling them."

Construction and Enterprise

Ohio

BROOKVILLE, O.—Voters approved bond issue of $32,000 at November election, and the proceeds will be used for part of cost of construction of new sewage disposed plant, WPA to defray remaining expense. E. P. Landis is mayor, and Arthur E. Bauer, Mutual Home building, Dayton, is consulting engineer.

BUCYRUS, O.—City voters have approved expenditure of $75,000 as city's share of cost of proposed sewage disposal plant. Plans await PWA approval. Probable consulting engineer is Paul M. Uhlmann, 2083 Dayton avenue, Columbus.

CANTON, O.—Berger Mfg. Co., 1038 Belden avenue Northeast, subsidiary of Republic Steel Corp., is considering enlarging present plant in view of expected increased business in the building products fabrication field. L. S. Hamaker is executive vice president.

CLEVELAND — City department of public service, Miles Evans director, room 213, City Hall, plans purchase of sewage plant equipment for the Easterly works, Lake Shore boulevard and East 140th street. City engineer is Robert Hoffman, 518 City Hall, and consulting engineer is George B. Gascoigne, Leader building.

DAYTON, O.—Miami Valley Tobacco Co., 316 East Huffman avenue, will rebuild its plant which was recently destroyed by fire. Including installation of new machinery. The cost is estimated at $25,000. Howard Green is secretary and manager.

DEFIANCE, O.—Defiance Metal Products Co. has been organized and has leased a portion of the Litchfield Stamping Co. plant for operations beginning around Jan. 1. Fred L. Weisgerber is temporary general manager.

MARTINS FERRY, O.—Service Director Walter Lipphardt has submitted a proposal to council requesting purchase of new 3500-kilowatt turbine for municipal light plant. Cost is estimated at $100,000.

NELSONVILLE, O.—City council has authorized issuance of $50,000 mortgage revenue bonds to meet part of the cost of improvements at the municipal light plant. A WPA grant of $36,000 has been obtained.

TIFFIN, O.—Northern Central Rural Electrification Co-operative Inc., R. J. Williams manager, Tiffin, plans erection of electric transmission lines in Crawford, Hancock, Wood, Huron, Seneca and Wyandot counties, totaling about 850 miles. Cost is estimated at close to $875,000, and federal aid will be sought in financing.

TOLEDO, O. — Libbey - Owens - Ford Glass Co. will construct a new research building costing $475,000. D. H. Goodwillie, is executive vice president in charge, and Toledo Associates, 2325 Madison avenue, Toledo, are architects and engineers.

WELLSVILLE, O.—City plans construction of filtration plant to cost $106,000, and has applied to PWA for $47,700 grant to help finance project. Fred Gluth is service director, city hall.

WOOSTER, O.—Wayne County Electric Co-operative Inc., care of Ohio Farm Bureau, 620 East Broad street, Columbus, plans erection of rural transmission lines to cost $280,000. Carl Frye is engineer. Allocation of federal funds has been approved.

YOUNGSTOWN, O.—Ohio Edison Co., W. C. Giffels in charge of construction, 47 North Main street, Akron, plans construction of 35,000-kilowatt electric generating plant near Youngstown. Samuel Stites is local general manager, 25 East Boardman street, Youngstown.

Michigan

BAY CITY, MICH.—National Electric Welding Machines Co. will double its production capacity after completion of an

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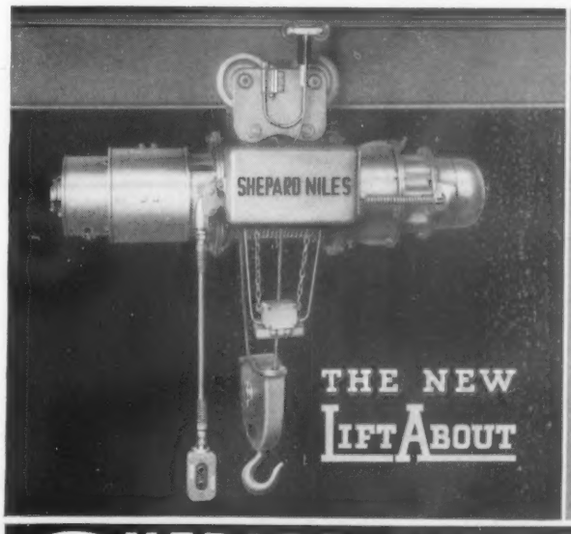

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expansion program which will begin shortly.

COOPERSVILLE, MICH. — Zoerner Brass Works, Grand Rapids, manufacturer of brass nickle-plated automobile supplies and plumbing fixtures, is moving its factory to Coopersville and may make improvements.

JACKSON, MICH.—Goodyear Tire & Rubber Co., Akron, O., plans expenditure of $3,500,000 for modernization of its newly acquired plant of the Kelsey-Hayes Wheel Corp. Clifford Slosser is vice president in charge of production.

LANSING, MICH.—City is taking bids due 8 p.m. Jan. 11 for construction of sewage pumping station and installation of equipment. Bertha Ray is city clerk, city hall, and Shoecraft, Drury & McNamee, 103 East Washington street, Ann Arbor, are consulting engineers.

MUSKEGON HEIGHTS, MICH.—Norge Corp. will construct six plant additions and make various improvements to its $120,000.

SUTTON'S BAY, MICH. — Construction will start early in spring on the $125,000 fruit and vegetable canning factory which has been authorized by a New York syndicate, represented by Sherman L. Eaton, attorney, Traverse City, Mich.

Connecticut

HARTFORD, CONN.—Hartford Electric Light Co., 266 Pearl street, will construct an addition to the South Meadow station at an estimated cost of $3,250,000. Equipment to be installed includes a boiler with a capacity of 400,000 pounds of steam hourly and a 53,300-horsepower turbine generator. Stone & Webster Engineering Corp., 90 Broad street, New York, is in charge.

New York

BUFFALO—Ludlum Steel Co., Watervliet, N. Y., has purchased the plant of the Electric Alloy Corp. on River road, where stainless, heat-resistant castings will be manufactured.

DUNKIRK, N. Y.—Dunkirk Radiator Co. will build a second story to its plant early in 1937.

NEW YORK—Mechanical Enterprises Inc., 315 Broadway, has been organized to deal in machinery and tools.

NEW YORK—Spencer Equipment Corp. has been organized to deal in machinery and tools, and Isadore Jacobs, 170 Broadway, is correspondent.

NEW YORK—Consolidated Products Co., dealer, 16 Park Row, is in the market for two Patterson 27-inch, 72-plate round rail filter presses.

WEST POINT, N. Y.—Construction quartermaster, United States Military academy, will receive bids until Jan. 6 for construction of additions to power plant at institution, including installation of new equipment.

Kentucky

LOUISVILLE, KY.—Louisville & Nashville railroad, 314 West Jefferon street, plans installation of motors and controls, conveyors, regulators, electric hoists and other equipment in connection with retooling program at locomotive and car repair shops at South Louisville, Nashville and Paris, Tenn., Birmingham and Mobile, Ala., and other cities. Cost will be about $400,000.

New Jersey

SPOTSWOOD, N. J.—American Pulp Corp., 182 Cornelison avenue, Jersey City, plans installation of motors and controls, regulators, conveyors and other equipment in new pulp and paper mill at Spotswood, where the former plant of the American Salpa Co. has been purchased. The old plant will be remodeled and re-equipped at a total cost of over $300,000.

Pennsylvania

DUBOIS, PA.—Pittsburgh-DuBois Co. was recently incorporated and will manufacture water pressure regulators and heat controls, in addition to the regular work formerly carried on by the DuBois Iron Works. President is L. A. Dixon.

ERIE, PA.—Perry Furnace Co., Wayne street, plans construction of an all-steel machine shop and storage building near its main plant.

Illinois

CHICAGO—Caspers Tin Plate Co., 3424 West Forty-eighth street, plans installation of motors and controls, conveyors, electric hoists and other equipment in two-story addition, 234 x 337 feet. Cost will be about $350,000, and A. Epstein, 2001 West Pershing road, is engineer.

Mississippi

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Foundry Co. plant was damaged recently by fire.

North Carolina

HIGH POINT, N. C.—McManus Motors Inc. will occupy a building on North Wrenn street after improvements are completed. Modern equipment will be installed.

WILMINGTON, N. C.—Tidewater Power Co., P. A. Matthes president, has applied to REA for an additional loan of $150,000 to build 150 miles of rural electrification lines in 16 North Carolina counties.

South Carolina

ABBEVILLE, S. C.—City plans municipal hydroelectric power plant on Rocky river, cost estimated at about $500,000. A federal grant and loan of $435,000 has been secured.

COLUMBIA, S. C.—State Rural Electrification Authority of South Carolina, 1202 South Main street, will receive bids until Jan. 18 for construction of rural transmission lines of approximately 174 miles in counties near Columbia.

Tennessee

JACKSON, TENN.—City commission has adopted a resolution for a bond election March 4, 1937, on bonds not to exceed $364,000. A federal grant of $299,000 has been secured, and the total would be used for construction of a distribution system connecting with the Tennessee Valley Authority at Knoxville.

KNOXVILLE, TENN. — City plans installation of pumping unit at Williams Creek waterworks plant, at an estimated cost of $185,000.

PARIS, TENN. — Kentucky-Tennessee Light & Power Co., W. J. Holman manager, will let contract soon for construction of a $40,000 addition to the water plant, where new filtration equipment will be installed.

Virginia

DANVILLE, VA.—City will receive bids Jan. 15 for erection of a 66,000-volt electric transmission line. Engineer is Charles T. Main, 201 Devonshire road, Boston.

HARRISONBURG, VA.—City plans extensions in municipal light plant, including installation of new equipment. Cost will be about $100,000 and bids will be asked soon. Federal aid will be sought in financing.

NORFOLK, VA.—Henry Walke Co., dealer, is in the market for the following equipment: 100 to 125-horsepower tubular boiler with 125 pounds working pressure; two vertical steam engines, one 5 to 7½-horsepower, the other 10 to 12-horsepower; a horizontal steam engine, 15 to 20-horsepower, and two steam process kettles.

Missouri

ST. LOUIS — Plant of Schaeffer Brothers & Powell Mfg. Co. lubricant manufacturer, Kosciusko and Barton streets, was damaged by fire recently.

ST. LOUIS—Mississippi Valley Equipment Co., dealer, Chamber of Commerce building, is in the market for three electric motor-driven fire pumps, two 150-gallons-per-minute, and one 2000-gallons-per-minute; and for a condensing turbo-generator, 500 to 750-kilowatts, 3-phase, 60-cycle, 2300-volt.

Texas

DALLAS, TEX.—Texas Electric Service Co. plans erection of transmission lines for rural electrification in parts of Tarrant county, totaling about 250 miles, at an estimated cost of $285,000. Federal aid has been secured.

HILLSBORO, TEX.—Hill County Electric Co. will ask bids in January for construction of 300 miles of rural distribution lines in Hill, Ellis and Johnson counties. Engineer is William G. Morrison, 204 Professional building, Waco, Tex.

HOUSTON, TEX. — Houston Machinery Co., dealer, 3119 Navigation street, is in the market for various kinds of oil mill machinery, and for a natural gas or diesel engine of 250 or 300-horsepower, 3-phase, 60-cycle, 2300-volt.

HOUSTON, TEX.—Gulf Portland Cement Co., Harper Holt president, Trinity Life building, Fort Worth, plans construction of cement manufacturing plant costing $75,000, to have a daily capacity of 500,000 pounds.

HOUSTON, TEX.—Regan Forge & Engineering Co., San Pedro, Calif., plans installation of motors and controls, conveyors, transformers and auxiliary power substation equipment, electric hoists and other equipment in new oil well machinery manufacturing plant at Houston. Cost is estimated at over $100,000.

MARSHALL, TEX.—Harrison-Panola Electric Membership Corp., care of Julian Pitts, has $84,000 allotment from REA for erection of rural lines, and will probably ask bids in January. Engi-

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neer is William G. Morrison, 204 Professional building, Waco, Tex.

SEGUIN, TEX.—City plans enlargement and improvement of municipal waterworks system and WPA has granted an application for financial aid.

Wisconsin

ALMA, WIS.—Buffalo County Electric Co-operative Inc., Arthur Hitt secretary, Alma, will ask bids for erection of rural electrification lines in Buffalo county, totaling about 250 miles. Federal aid in the amount of $260,000 has been secured. E. B. Wayts, Capitol building, Madison, is engineer.

Minnesota

MONTEVIDEO, MINN. — Minnesota Valley Co-operative Light & Power Co., E. L. Smith president, plans erection of rural transmission lines in parts of Chippewa, Lac qui Parle and other counties, totaling about 300 miles and costing about $325,000. Federal aid will be sought in financing.

North Dakota

JAMESTOWN, N. DAK.—City will build water softening and filtration plant costing $95,000. A. R. Thompson is auditor, and Gilbert Horton is city engineer, city hall.

RICHARDSON, N. DAK.—Voters have approved issuance of bonds in connection with construction of proposed municipal waterworks system to cost about $50,000. K. E. Giedt is city clerk, and T. R. Atkinson, Bismarck, N. Dak., is engineer.

WALHALIA, N. DAK.—Village plans construction of municipal light and power plant to cost $40,000, with PWA aid in that amount. H. N. Lee is auditor, and C. D. Norton, Bismarck, N. Dak., is engineer.

South Dakota

FLANDREAU, S. DAK.—Village plans construction of municipal light and power plant costing $168,770, of which PWA has allotted $76,000. S. L. May is mayor, and John W. Emberg, Madison, S. Dak., is engineer.

MADISON, S. DAK.—City plans extension to waterworks system at a cost of $27,270, to be allotted by PWA. George Simpson is auditor, city hall.

RELIANCE, S. DAK.—Village plans construction of waterworks system costing $26,364, with funds allotted by PWA E. K. Kentch is village clerk, and Dakota Engineering Co., Mitchell, S. Dak., is engineer.

Iowa

CEDAR FALLS, IOWA—Viking Pipe Co. plans construction of plant addition to cost approximately $70,000.

DES MOINES, IOWA—Iowa Light & Power Co., 111 Locust street, plans construction of rural transmission lines in Madison and Dallas counties.

DES MOINES, IOWA—Kenneth's Distribution Co., K. Sonderleiter president, 819 Twelfth street, plans construction of a bottling plant addition to cost about $115,000.

ELDORA, IOWA—City has engaged Young & Stanley Inc., Muscatine, Iowa, consulting engineers, to make surveys and estimates of cost of proposed municipal power plant.

MASON CITY, IOWA—Peoples Gas & Electric Co. plans erection of rural transmission lines in Floyd, Cerro Gordo and Worth counties.

Nebraska

DWIGHT, NEBR.—Voters have approved issuance of $10,000 bonds in connection with construction of new village waterworks system to cost about $22,000. Engineer is Henningsen Engineering Co., Union State building, Omaha.

Pacific Coast

BURBANK, CALIF.—Lockheed Aircraft Corp. will build a new factory and administration building here. A site of 43 acres, costing $165,000, has already been purchased.

LOS ANGELES—Board of education will ask bids soon for motorization of machines and equipment in high school shops at an estimated cost of $10,000. A. S. Nibecker, 1425 South San Pedro street, is in charge.

Canada

WINDSOR, ONT.—Ford Motor Co. of Canada will build a new body manufacturing and assembly plant adjoining its Windsor factory. Construction will start early in 1937 and the cost is estimated at $3,300,000. Wallace R. Campbell is president.

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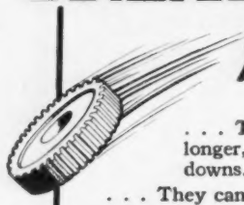

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Steelmaking

(*Concluded from Page* 425)

opinion probably have been in the hard hematite districts and beneficiation of raw materials continues to be chiefly responsible for progress in this respect. Completion of the first sintering plant in the Birmingham area was followed by coke practice of less than 2000 pounds per ton of pig, an accomplishment which it seems must finally overcome all opposition to crushing and sizing the ores of that district.

Foresee More Extensive Use

Equally satisfactory were the results with the Wabana ores at Sydney, N. S., by the expedient of crushing only. Further improvement and eventually more extensive use of these ores, which are of ideal structure physically, undoubtedly may be expected.

Finer crushing followed by sintering has also greatly improved the smelting quality of the eastern magnetites and lowered pig iron costs to an extent that the natural marketing territory of the eastern stacks should be defended more easily and probably will be widened.

These fortuitous experiences with sintered fines from hard ores, Mr. Haven explains, will no doubt strengthen the cause of those who have been advocating similar treatment for certain grades of Mesabis and encourage midwestern producers to support more generously this procedure which some few operators have pioneered with highly satisfactory results.

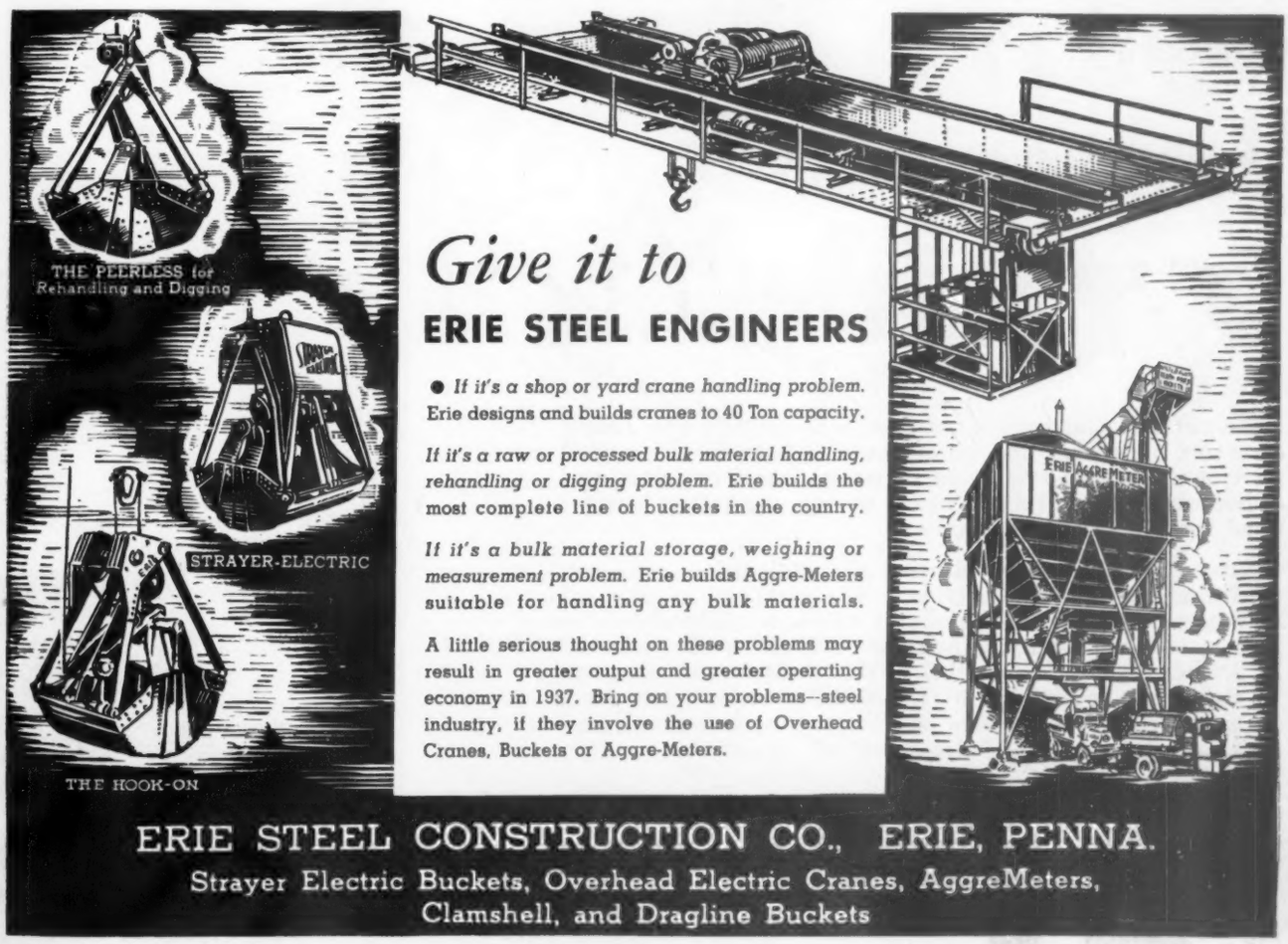
Generally speaking, furnace practice on Mesabi ores has shown but little improvement during the past year, Mr. Haven states in conclusion. No radical changes to furnace lines are to be noted. The pressure for greater output has made it difficult to retain all the advancement that was made during the slow blowing period. The problem of working out satisfactory stock distribution for the large tops has not yet been solved, at least in practice.

COMMENTS of R. H. Sweetser, consultant in blast furnace practice, New York are exactly the reverse of those he made five years ago when minimum production was desired and there was a surplus of stacks. Today, Mr. Sweetser asserts, it is a matter of maximum tonnage consistent with maximum quality of pig iron, and the industry has awakened to the fact that there are not enough blast furnaces to meet the requirements. For the first time since 1928 when the Fairfield, Ala., furnaces were built, he points out, additional new blast furnaces are being erected, "replacement" stacks not being considered.

Contrary to opinions expressed at the time NRA was established, Mr. Sweetser continues, this past year has established the fact that the merchant blast furnace in this country is not "a thing of the past." It is now more clearly recognized that dependable iron in pigs "of known chemical content" (as contracts read) is essential to castings of quality.

Raw Materials Are Improved

The year 1936 saw an advance in the quality and preparation of raw materials for the blast furnace, Mr. Sweetser declares. He draws attention to the fact that the enrichment and the sizing of iron ores are having much consideration, in the South as well as in the Lake Superior region. In equipment there has been an extended use of the automatic motor-driven tap-hole gun, and of the stockline recorder; both to obtain more uniform movement of the stock and greater regularity of the pig iron. The question before furnacemen at the moment, Mr. Sweetser states in conclusion, is "how can producers get more iron per stack and still make quality pig iron?"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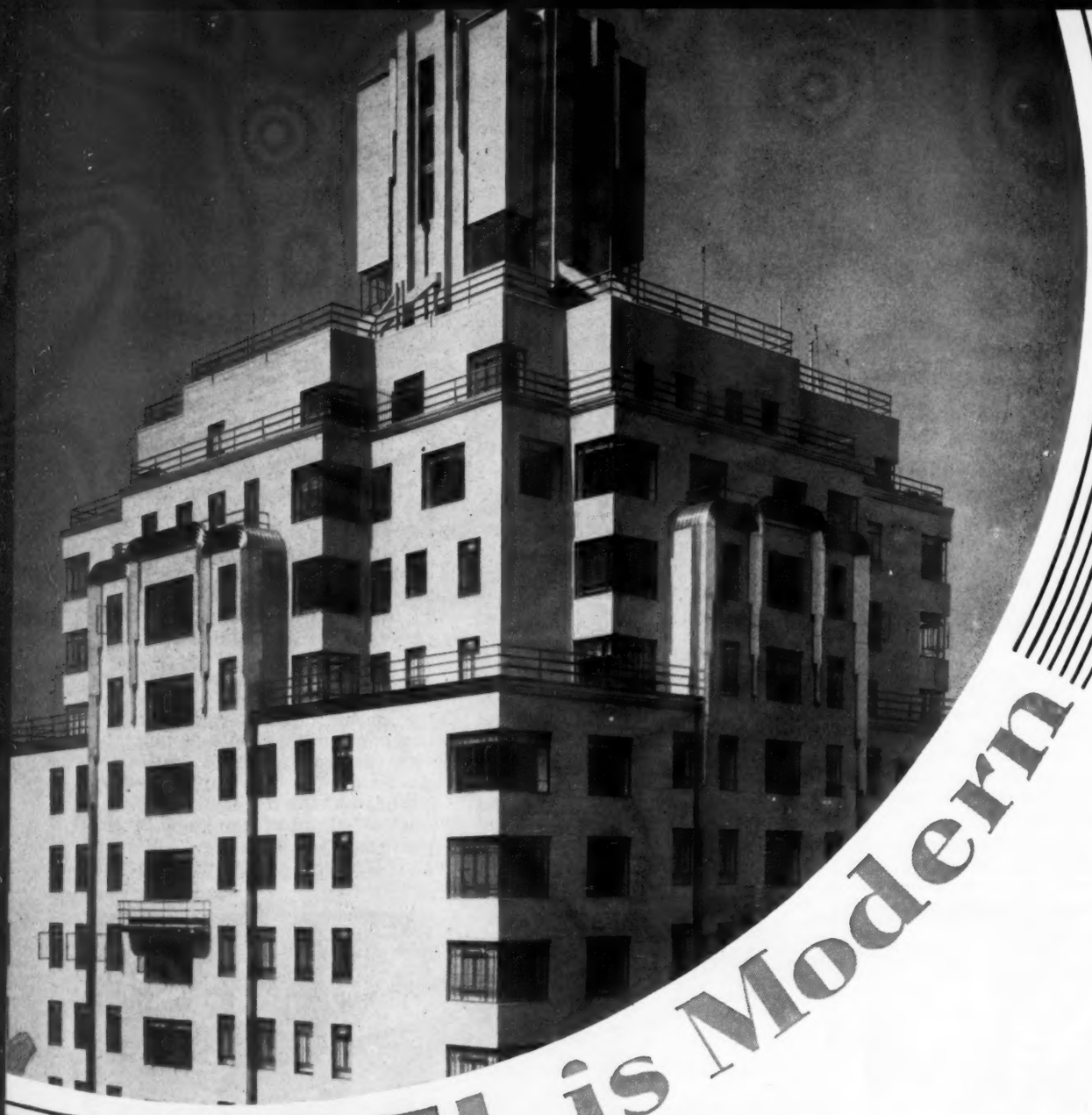

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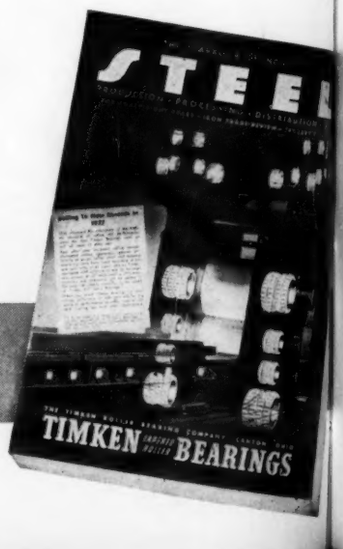
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